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A PRELIMINARY REVISION OF THE BRITISH PROCTOTRUPINAE (HYM., PROCTOTRUPOIDEA)

By G. E. J. Nixon, B.A.

(*Dept. of Entomology, British Museum (Nat. Hist.)*).

(Read 1st June, 1938.)

With Seventy-one Text-figures.

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I. Introduction.

This is the first of a series of papers the object of which is to revise the whole of the British Proctotrupoidea.

As in my previous contribution * to the study of our parasitic Hymenoptera, I make no claim in this revision to a complete treatment of its subject. The aim of the paper is solely to define, within a pre-existing framework of genera, the species belonging to the subfamily in question. It falls short of this aim in so far as it fails to deal satisfactorily with the males of a number of species. This weakness occurs chiefly within the genus *Exallonyx*.

The basis of the paper has been Haliday's *Hymenoptera Britannica, Oxyura*, published in 1839. With the help of his collection, now in the Dublin Museum, I have been able to establish the identity of all his species. I have also accepted his interpretation of species described by Nees von Esenbeck, since in their case he appears to be first reviser, and Nees' Proctotrupine types are lost.

Apart from a single instance, where the circumstances justify the making of an exception, I have ignored all records concerning the breeding habits or the distribution of British Proctotrupinae. To have accepted such records would have required a greater faith in the knowledge of the group on the part of those responsible for them than appears to be warranted. I say this without wishing for a moment to disparage the work of earlier writers who have so conscientiously striven to give us a picture of a difficult and much neglected group of insects. Their faults lay with a technique which, in my opinion, is both too easy and too superficial in range to lead to reliable results. It is necessary only to study the methods of the Abbé J. J. Kieffer, admitting that they led to the output of a prodigious amount of work, to find the bitter disillusionment that awaits every student of parasitic Hymenoptera.

The indefatigable Swedish entomologist C. G. Thomson was not acquainted with Haliday's 1839 paper. Hence his contribution to the Proctotrupinae of his own country contains almost solely descriptions of new species. As he

* The British species of *Dacnusa* (Braconidae), 1937, *Trans. Soc. brit. Ent.* **4**.

overlooked the form of the claws, all those species which could belong either to *Phaenoserphus* or to *Exallonyx* were placed by Kieffer in the former genus. This procedure has inevitably led to some confusion.

I have been privileged to see specimens believed to be the types of all Thomson's species. Most of them bear type labels as well as the data recorded by Thomson and agree in every detail with the descriptions given by him. As a result of examining this material, I have been able to establish a certain amount of synonymy.

One of Thomson's species, *Proctotrupes buccatus*, a remarkable-looking insect, placed by Kieffer in *Phaenoserphus*, has been recorded by Morley (1924) from this country. Mr. Morley has been kind enough to let me see his material of this species; it consists of three females, all determined by the late Rev. T. A. Marshall, and all belonging beyond doubt to the genus *Exallonyx*. They bear no resemblance to the genuine *P. buccatus*.

Morley has also recorded (1922) *Phaenoserphus micrurus* Kieff. and *Exallonyx xanthocerus* Kieff. I have seen this material and, in my opinion, the former species (2 exs.) is *Exallonyx brevicornis* (Haliday), while the latter (1 ♂) is a most unusual freak of *Phaenoserphus viator* (Haliday).

I am responsible for all the drawings in this paper. Those of the female abdomen are shown in order to give a clear impression of the relationship that exists between the size of the ovipositor and that of the rest of the abdomen. It will be seen that the shape of the tergites, as shown in the figures, varies considerably. No great importance should be attached to this variation, since it is due to the fact that the tergites are capable of being exserted to a greater or less degree and, in the dead insect, their position is likely to be distorted.

Concerning the recording of locality data, an apparent inconsistency will be noticed. This paper does not pretend to be a monograph, so in the case of common species, I give only the county; for species that are definitely not common or very restricted in range, I give actual place of capture; while for new or very rare species, full locality data are recorded.

Twenty-eight species are dealt with, of which five are described as new. The types of these new species are in the British Museum.

Finally, I wish to express my thanks and indebtedness to the following persons for the help they have given me : Mr. H. Britten for the loan of material; Mr. Claude Morley for lending me types and other valuable specimens; Dr. Roman for lending me Thomson's types from the National Museum, Stockholm; Father H. Schmitz, S.J., for the loan of types from Wasmann's collection; Mr. A. W. Stelfox for lending me the whole of his very extensive collection of Proctotrupinae, and the National Museum of Eire for the opportunity of studying the material there and for the loan, from Haliday's collection, of material which has made it possible for me to recognise all the latter's species.

II. Systematic.

The Proctotrupidae comprise a number of subfamilies which are not all obviously related to each other. The Proctotrupinae (Serphinae of Kieffer) is one of the most sharply defined. Without discussing its affinities now, I do not think it is closely related to the other subfamilies. Later, it may have to be raised to family status.

In the terminology used in the following keys and descriptions there is nothing original. But difficulty might arise over the names given to the

different parts of the antenna. I regard this as consisting of three parts: a basal segment (scape), a more or less spherical segment (pedicel) which fits according to a ball-and-socket arrangement into the scape, and 11 segments, which together form the funicle; the antenna thus is made up of 13 segments in both sexes.

While studying the males of *Exallonyx*, I found that the funicle is nearly always provided with patches of specialised structures. I am not prepared to say what their function is. It seems that the arrangement of these patches of structures has some taxonomic value, of which I have made full use in trying to separate out the males of *Exallonyx*. Apart from this genus and *Phaenoserphus* in which the males of all the British species have similar structures, I have not examined the funicle of the males in the other genera.

In order to see these specialised structures, the presence of which might otherwise very easily escape detection, it is necessary to remove the antenna and place it for five or ten minutes in weak potash.

Proctotrupinae.

Key to the genera.

1. Front and middle claws armed with a slender black spine beneath. (Ovipositor of ♀ short, narrowly subtriangular, pointed at apex) (p. 434) *Exallonyx* Kieff.
   All the claws simple . . . . . 2.
2. Propodeum in both sexes conspicuously smooth and shining, without a trace of a central keel; ♀ apterous, the wings being represented by a minute scale; ♂ fully winged, the venation very pale and indistinct (p. 446) *Paracodrus* Kieff.
   Propodeum in both sexes always strongly sculptured in greater part, and usually with a well-defined central keel; both sexes fully winged, rarely the wings shortened as in some forms of *Phaenoserphus viator* (Hal.); venation of ♂ not pale and indistinct . . . . . 3.
3. Notauli distinct throughout, but sometimes feeble. (Spp. with the radial cell long, measured along the edge of the wing, fully two-thirds the length of the stigma; fore-wings with well-marked spurious veins; petiole not in the least hidden by tergite 2; at least funicle segments 4–6 of the ♂ with a keel-like or tooth-like projection beneath) (p. 447) *Disogmus* Först.
   Notauli not distinct throughout . . . . . 4.
4. Abdomen usually conspicuously reddish at least basally; sides of the pronotum strongly sculptured. (Spp. with the ovipositor of the ♀ filiform, at least about as long as the hind tarsus) (p. 450) *Proctotrupes* Latr.
   Abdomen entirely black or blackish; sides of the pronotum almost always smooth and, when not smooth, then the ovipositor not filiform and much shorter than the hind tarsus . . . . . 5.
5. Petiole concealed from above by the base of tergite 2. (Spp. with the ovipositor of ♀ longer than the basal segment of the hind tarsus and except in *C. parvulus* (Nees) (which has the radial cell almost wanting) filiform and very narrow) . . . . . (p. 460) *Cryptoserphus* Kieff.
   Petiole not concealed from above by tergite 2. (Spp. with the ovipositor of ♀ narrowly subtriangular, evenly narrowed to apex and, except in the case of *P. elongatus* (Hal.), never longer than the basal segment of the hind tarsus . . . . . (p. 451) *Phaenoserphus* Kieff.

Exallonyx Kieffer.

At least as regards the British species, this genus is sharply defined on account of the remarkable claw appendages.

The species are closely related and several of them are undoubtedly difficult to separate, though this is much more true of the males than of the females.

Speaking generally, in order to identify a female *Exallonyx*, only three parts of the insect need to be considered, namely, the antenna, the head and the ovipositor. A combination of differences in the form of these three parts, usually sums up what is characteristic in a species. But matters are much worse with the males and I cannot claim that the results of a laborious study of a large number of specimens are at all satisfactory.

Against the ten species given in the key to the females, there are only five in the key to the males, and of these five there are only three cases in which I have been able to associate the two sexes.

Apart from these five species, I have divided all other males over a certain size and possessing certain characteristics of colour into three groups, each of which may later prove to be homogeneous. At the moment, however, I am not at all confident that these three groups do actually represent as many species. On the other hand, I am fairly well convinced that each of them contains elements capable of being shown eventually to constitute good species.

In defence of this method of dealing with a particular taxonomic problem, I can say only that I believe it to suggest the lines along which further investigation will have to be made.

Key to ♀♀.

1. Ovipositor, in lateral aspect, with both its upper and lower side quite straight. (Sp. with the head unmistakably transverse; penultimate segment of the antenna fully twice as long as wide; frons with a prominent, raised keel between the antennal insertions) . (1) *niger* (Panzer).
   Ovipositor, in lateral aspect, with at least its upperside evenly, if only slightly, curved . . . . . 2.
2. Frons not strongly raised to form a conspicuous keel between the antennal insertions, the surface here more or less flat with at most a fine longitudinal ridge; funicle 1 at least 1½ times as long as the scape. (Sp. with the antennae very long and slender, the penultimate segment fully twice as long as wide; legs long and slender; ovipositor very short, only about half as long as the basal segment of the hind tarsus and with a distinct downward curve *at apex*; also with scattered, more or less oblong punctures) . . . . . (4) *longicornis* (Nees).
   Frons strongly raised to form a conspicuous keel between the antennal insertions (or, if somewhat weak, then the antennae are very short, not longer than head and thorax together); funicle 1 not, or hardly, longer than the scape . . . . . 3.
3. Ovipositor predominantly and characteristically longitudinally aciculated. (Spp. with the antennae thick, the more apical segments by no means clearly cylindrical; the head never conspicuously transverse) . . . . 4.
   Ovipositor never aciculated, its sculpture consisting of small more or less oblong punctures on a smooth shining surface . . . . . 5.
4. Head clearly wider than long; funicle 8–9 clearly longer than their apical width . . . . . (2) *ligatus* (Nees).
   Head not wider than long; funicle 8–9 not obviously longer than their apical width . . . . . (3) *microcerus* Kieff.

5. Tergite 2 usually without a trace of striation at base and, in any case, without a median furrow. (Small sp. about 2 mm., with the head only very slightly transverse) . . . . . (10) *wasmanni* Kieff.
   Tergite 2 with at least a median and 2 short lateral furrows . . . . . 6.
6. Head very distinctly transverse . . . . . 7.
   Head by no means distinctly transverse . . . . . 8.
7. All the funicular segments conspicuously elongate, the penultimate fully twice as long as its apical width; ovipositor not at all noticeably decurved *at apex*. (Length 3·5 mm.) . . . . . (5) *ater* (Nees).
   At least the more apical funicular segments not conspicuously elongate, the penultimate segment not more than 1½ times as long as its apical width; ovipositor markedly decurved *at apex*. (Sp. with the funicle short, clearly a little narrowed towards the apex; ovipositor very short, about two-thirds the length of the basal segment of the hind tarsus) (9) *brevicornis* (Hal.).
8. Funicle 9 fully twice as long as its apical width. (Sp. with the funicular segments conspicuously elongate, cylindrical) . . . . (6) *gracilis* sp. n.
   Funicle 9 at most about 1½ times as long as its apical width. (Small spp., at most 2·8 mm.) . . . . . 9.
9. Malar space a little less than half length of eye; head, seen from in front, with its sides more or less parallel. (Sp. with the peristomium very wide; the vertex considerably raised) . . . . . (8) *curtigena* sp. n.
   Malar space greater than half the length of the eye; head, seen from in front, with its sides clearly convergent below. (Sp. with the peristomium less wide and the vertex less raised than in *curtigena*) . (7) *confusus* sp. n.

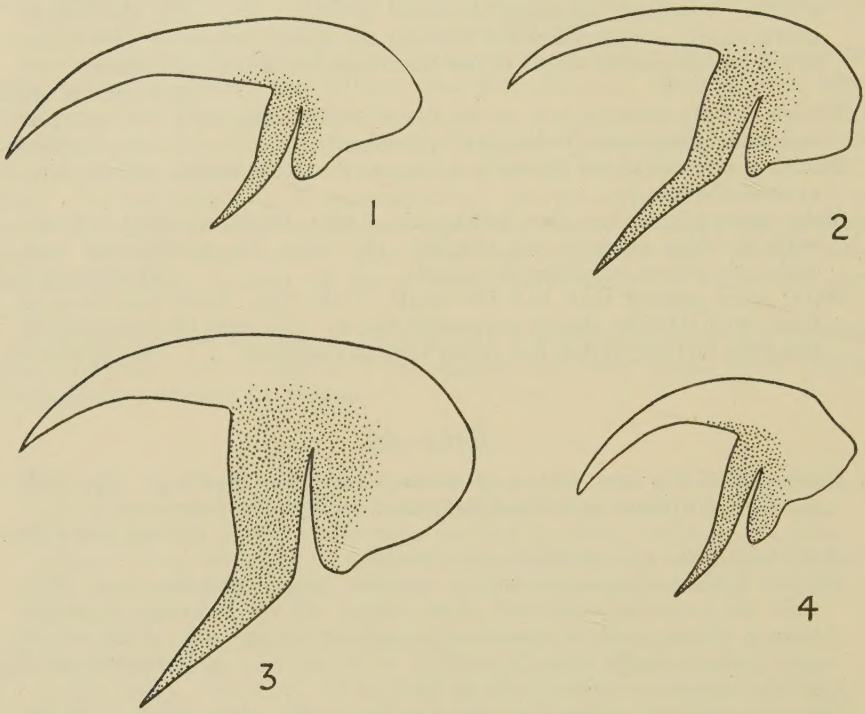
Key to ♂♂.

1. Head behind the eyes with a prominent, hump-like swelling. (Sp. with the funicle without specialised structures on any of its segments) (4) *longicornis* (Nees).
   Head behind the eyes without such a swelling . . . . . 2.
2. All the funicular segments with a smooth, raised, keel-like area. (Sp. with the antennae somewhat short, thick; all the funicular segments have a dense patch of specialised structures on one side of the raised area; wings usually strongly smoky) . . . . . (11) *donisthorpei* Kieff.
   Funicular segments without such an area . . . . . 3.
3. Tergite 2 without a trace of striation at base. (Sp. about 2 mm.; all the legs, except coxae, entirely yellowish) . . . . . (10) *wasmanni* Kieffer.
   Tergite 2 with at least two short furrows on each side at base . . . . 4.
4. All the funicular segments with a large patch of specialised structures; these segments further markedly less hairy over the area occupied by the structures than elsewhere. (Sp. with all the femora uniformly reddish-yellow; hind tarsi very rarely blackened; usually a well-marked yellowish streak beneath the stigma) . . . . . (1) *niger* (Panzer).
   At least funicle 1 without specialised structures; if they occur on any of the other segments, the area occupied by them is not of such a size that its presence can be detected by the segment being less hairy here than elsewhere . . . . . 5.
5. Funicular segments without patches of specialised structures; at most a few small, isolated structures on the more apical segments; cleft between the claw-tooth and base of claw of front tarsus, hardly deeper than the length of that part of the tooth beyond it (fig. 4). (Sp. with the funicle short, about as long as the costa and stigma together) (9) *brevicornis* (Haliday).

Funicular segments 2–11 with a small patch of specialised structures (on funicle 2 and 11, the patches tend to be reduced to a single structure); cleft between the claw-tooth and the base of claw of front tarsus much less deep than the length of that part of the tooth beyond it (fig. 2)
(12) Groups of ♂♂, *I*, *II* & *III*.

1. *Exallonyx niger* (Panzer, 1805).

♀. Unmistakable on account of the straight-sided ovipositor, which is very shining and has scattered, more or less oblong punctures. Head (fig. 18). Antennae variable



Figs. 1–4.—Claw of front tarsus of: 1. *Exallonyx longicornis* (Nees), ♂; 2. *Exallonyx* (Groups I–III of ♂♂); 3. *Exallonyx niger* (Panz.), ♂; 4. *Exallonyx brevicornis* (Hal.), ♂.

in colour, usually with the scape and funicle (except the first two segments which are paler) blackish (fig. 26). Fore-wings markedly brownish and with indications of spurious veins. Abdomen (fig. 8).

♂. Legs, except for coxae, almost always reddish-yellow throughout as in the ♀; claw of front tarsus (fig. 3). Funicle somewhat short (fig. 29), tapering slightly towards apex; its pubescence short and erect and, at least on segments 2 and 3, only about ⅓ the width of the segments; by careful examination, it is always possible to see the comparatively bare patch on each funicular segment, occupied by the specialised structures.

Length: ♂ 4–5 mm.; ♀ 4·5–6·5 mm. (including ovipositor).

Distribution: England: Berks; Bucks (Farnham Royal), 10 examples, comprising both sexes, bred from a single Carabid larva; Devon; Kent; Middlesex; Surrey. Ireland: taken by A. W. Stelfox in the following

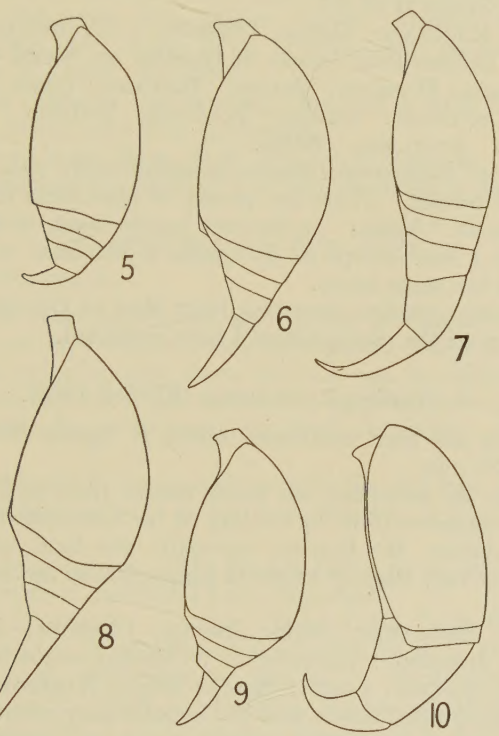
counties: Antrim; Carlow; Down; Dublin; Kildare; Leitrim; Queen's County; W. Donegal; W. Mayo; Wexford.

E. niger seems to be a fairly common species, especially the male, occurring throughout the summer and autumn.

2. *Exallonyx ligatus* (Nees, 1834).

1922, *Proctotrupes hyalinipennis* Morley (**syn. n.**).

This and the next species form a natural group, characterised in the female by the thick antennae, the penultimate segment of which is at most about $1\frac{1}{2}$



FIGS. 5–10.—Abdomen of: 5. *Exallonyx brevicornis* (Hal.), ♀; 6. *Exallonyx ligatus* (Nees), ♀; 7. *Phaenoserphus elongatus* (Hal.), ♀; 8. *Exallonyx niger* (Panz.), ♀; 9. *Exallonyx ater* (Nees), ♀; 10. *Paracodrus apterogynus* (Hal.), ♀.

times as long as its apical width (fig. 20); the more apical funicular segments are not at all evenly cylindrical, being distinctly scooped out basally on the lower side. Head (fig. 15). Propodeum usually very sharply truncate posteriorly and often smooth over its entire dorsal surface. Ovipositor as in key. Abdomen (fig. 6).

E. ligatus is on an average much larger than the following species, attaining a length of 4·8 mm. (measurements include ovipositor), while *E. microcerus* Kieff. in largest examples does not seem to exceed 3·5 mm.

Individuals of *E. ligatus* over 3·8 mm. (*i.e.* the majority and averaging 4·5 mm.) need not be confused with *E. microcerus*. Apart from the differences mentioned in the key, which are the only reliable ones, the 8 or 9 apical

funicular segments of *E. ligatus* are black suffused with red within the scooped-out basal part; early summer examples (May–June) frequently have the 4 or 5 basal funicular segments strongly blackened, in which case the apical segments are entirely black. The colour of the legs is somewhat variable but in the majority of individuals over 3·8 mm. all the femora are clear reddish-yellow.

In small individuals averaging 3·5 mm. (I have seen none smaller than 3·2 mm.), the funicular segments are relatively shorter and 8–9 are often but little longer than wide; in such examples as these, the shape of the head provides the more reliable criterion for separation from *E. microcerus*.

♂. See below, Group II of ♂♂.

Distribution: England: Berks; Cheshire, 2 ♀♀, bred iii.1925, as solitary parasites, by H. Britten from larvae of *Quedius* sp. found in a mole's nest; Cumberland; Hants; Hereford; Surrey. Ireland: taken by A. W. Stelfox in the following counties: Dublin; E. Cork; Leitrim; Queen's County; Sligo; Waterford. Scotland: Nairn.

As Nees' type of *Proctotrupes ligatus* is undoubtedly lost, Haliday must be taken as the first reviser. There are plenty of specimens in his collection at Dublin bearing labels "*ligatus*" in his own handwriting, and it is certain that the species which I here accept as *E. ligatus* is identical with that to which Haliday accorded the same name.

This is a common species, occurring from May to October. I have taken it (by sweeping) in all the places where I have collected.

3. *Exallonyx microcerus* (Kieffer, 1908).

♀. This species has been mentioned under *E. ligatus* (Nees). It varies in size from 2·4 to 3·5 mm.

On the whole, the antennae are much redder than in *E. ligatus* (fig. 21), the more apical segments (5 or 6) tending to be darkened only above. Head (fig. 17). Legs darker, the femora, especially the hind ones, suffused with black. Ovipositor very slightly longer in proportion to the size of the abdomen than in *E. ligatus*.

Distribution: England: Berks; Bucks; Cheshire; Kent; Middlesex; Lancs; Surrey. Ireland: taken by A. W. Stelfox in the following counties: Antrim; Dublin; Kildare; Louth; Meath; Sligo; Wexford; West Mayo.

This is a very common insect and the females may often be found running over heaps of rotting vegetation, where they are probably searching for beetle-larvae in which to oviposit.

Considerable care is needed to separate large examples of this species from small examples of *E. ligatus*. There seem to be only two criteria of value to use: the shape of the head and that of the funicular segments; the former seems to be the more reliable.

4. *Exallonyx longicornis* (Nees, 1834).

♀. This species is very distinct on account of the long filiform antennae, absence of carina between the antennal insertions—at most a fine ridge is present—and the short ovipositor, with its slight but distinct, downward, apical curve.

The head is unmistakably transverse (fig. 19). Antenna (fig. 25). The legs, especially the hind pair, are very slender and, in this respect alone, *E. longicornis* differs from the other members of the genus; they are, further,

very variable in colour, usually dull yellowish-red with dark coxae and with, or without, hind tibiae at apex, and hind tarsi throughout, darkened.

The abdomen tends to be somewhat globose, certainly more so than in the other members of the genus.

♂. Very distinct on account of the hump-like projection on each side of the head behind the eye. The funicle is slightly but distinctly narrowed towards the apex (fig. 30), its pubescence very short, and, at least on segments 2 and 3, a little less than half the width of the segment; an examination in potash of the funicle of four individuals from widely separated localities revealed no trace of specialised structures. Claw of front tarsus (fig. 1).

Length : ♂ 3·5–4·5 mm.; ♀ 3·8–4·5 mm. (including ovipositor).

Distribution : ENGLAND : Cambridge; Devon; Hants; Hereford; Herts; Kent; Surrey. IRELAND : taken by A. W. Stelfox in the following counties : Dublin; Leitrim; S. Kerry; Wicklow.

This species is certainly not common, but has a wide distribution. The male seems to be much rarer than the female.

Dates of capture range from April straight through to October, but May and June are apparently the months in which the insect is most frequent.

5. *Exallonyx ater* (Nees, 1834).

1908, *E. filicornis* Kieffer (**syn. n.**).

This species, at least as regards the female, is sharply defined and need not be confused with any other British *Exallonyx*. Nevertheless, it is closely related to the following species, from which it can be distinguished only by the transverse head (fig. 16); this criterion is easy to appreciate in the present case and there seems to be no reason to doubt its value. Antenna (fig. 23). Abdomen (fig. 9).

In the Irish material I have examined (26 ♀♀), the legs, except the coxae, are uniformly reddish-yellow; in the one English ♀ the hind femora are darkened above.

Length : 3·6 mm., approx. The species seems to be very constant in size in the limited amount of material I have examined.

Distribution : ENGLAND : London (Tulse Hill), Sept.–Oct., 1 ♀, *G. N.* IRELAND : taken by A. W. Stelfox in Carlow (Kilcarry), Aug., 1 ♀; Dublin (Saggart), Sept., 4 ♀♀; (Glenasmole), Oct., 1 ♀; (Little Bray), Oct., 3 ♀♀; Wicklow (Athdown), 4.x.1933, 13 ♀♀ from carcase of whale; (Ballyhenry), Aug., 1 ♀; (Connary), Oct., 1 ♀; (George's Bridge), Oct., 1 ♀.

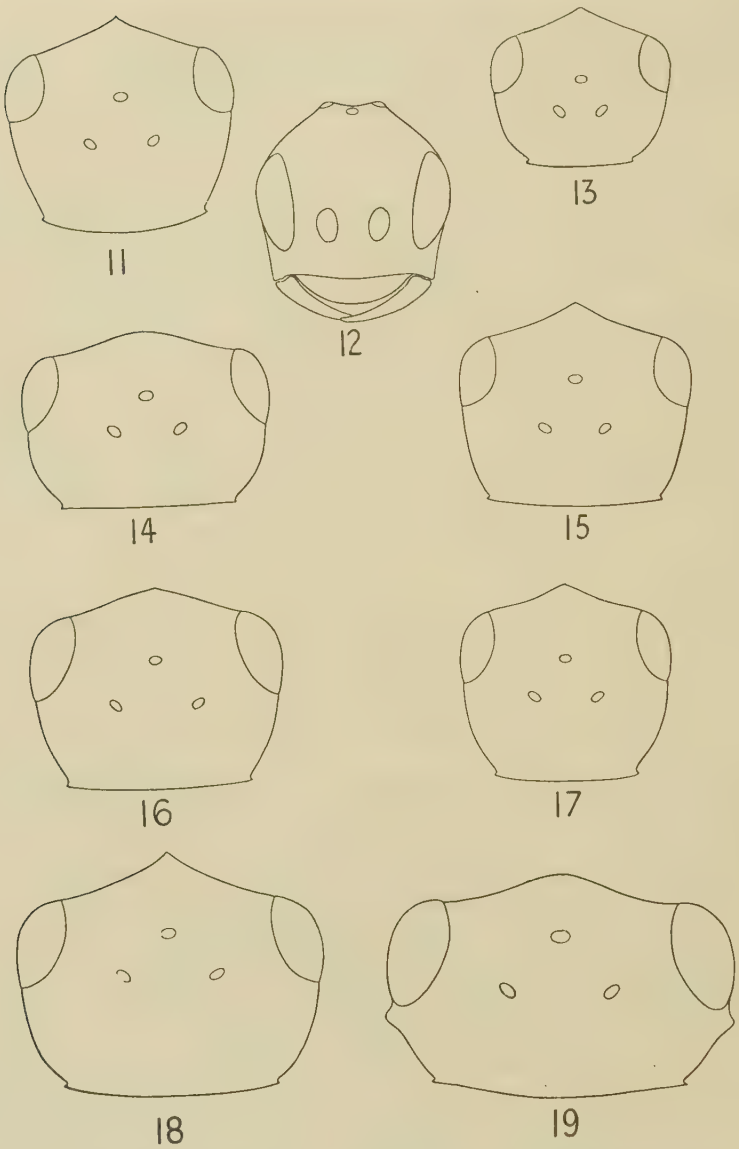
Kieffer, as Morley (1922) has already pointed out, rejected Haliday's interpretation of *Proctotrupes ater* Nees on the authority of Vollenhoven. Haliday, however, was first reviser and it becomes necessary accordingly to see how he interpreted Nees' species. It is known that the original type is lost. There are several specimens in Haliday's collection, all bearing the name "*ater*" in his own handwriting and all representing one species.

It should be noted that no examples of this species were taken before August and the majority were taken in October.

6. **Exallonyx gracilis** sp. n.

♀. This species differs from the former chiefly in that the head is not clearly wider than long. The legs are reddish-brown to brownish with all the femora darkened above, especially in Irish examples. Head (fig. 11). Antenna (fig. 22).

Length : 3·2–3·6 mm.



Figs. 11–19.—11. *Exallonyx gracilis* sp. n., ♀, head from above; 12. *Exallonyx curtigena* sp. n., ♀, head from in front; 13. *Exallonyx confusus* sp. n., ♀, head from above; 14. *Exallonyx brevicornis* (Hal.), ♀, head from above; 15. *Exallonyx ligatus* (Nees), ♀, head from above; 16. *Exallonyx ater* (Nees), ♀, head from above; 17. *Exallonyx microcerus* Kieffer, ♀, head from above; 18. *Exallonyx niger* (Panz.), ♀, head from above; 19. *Exallonyx longicornis* (Nees), ♀, head from above.

Distribution: England: Cheshire (Sunderland), 19.viii.1933, 1 ♀, *H. Britten*; Surrey (Ashtead), 25.viii.1929, 1 ♀, *Holotype*, *G. N.*; (Bookham), 14.ix.1929, 1 ♀, *G. N.*; (Coombe), 5.x.1931, 1 ♀, *A. W. Stelfox*. Ireland: taken by A. W. Stelfox in the following places: Dublin (Saggart), xi.1935,

2 ♀♀; Wicklow (Athdown), 4.x.1933, 1 ♀; (Glencullen), 13.x.1935, 1 ♀; (Powerscourt), 11.xi.1931, 1 ♀.

Exallonyx gracilis and *E. ater* form a natural group characterised by the slender antennae and the shining ovipositor with its scattered, irregularly shaped punctures.

E. gracilis is discussed below under the following species, of which it may eventually be shown to be only a large form.

7. **Exallonyx confusus** sp. n.

♀. The size of this little species varies between 1·9 and 2·8 mm., the average length being about 2·2 mm.

The legs are usually brownish throughout; even in the largest examples, in which the legs show a reddish tint, at least the femora are darkened more or less throughout.

Head (fig. 13). The funicle is not thickened towards the apex (fig. 37); there appears to be variation in the length of the segments and their vestiture according to the size of the insect; individuals under 2 mm. tend to have funicle 9–10 only about 1¼ times as long as their apical width and the entire funicle slightly more hairy; individuals over 2 mm. tend to have these segments slightly longer and the entire funicle slightly less hairy. The question of whether one is dealing with one or two species is not easy to settle.

The largest examples of *E. confusus* differ from *E. gracilis* only in size and in having the segments of the funicle shorter, and may well be small examples of that species, since a shortening of the funicular segments appears to be correlated with a diminution in the size of the insect, within the genus. On the other hand, small individuals of *E. confusus*, which, as far as I can see, grade imperceptibly into the larger ones, are less easily passed off as *E. gracilis*. Thus, since larger examples of *E. confusus* are separable from *E. gracilis* on size and length of funicular segments and these larger specimens are not separable from smaller ones by any character of appreciable magnitude, it seems wiser provisionally to regard the whole of the segregate under consideration as a single species distinct from, though close to, *E. gracilis*.

Distribution: England: Berks; Bucks; Devon; Hants; Kent; Middlesex (Hendon, July, 1 ♀); Surrey (Claygate, June, 2 ♀♀; these belong to the larger form discussed above); all material, except where otherwise stated, taken in August–October. Ireland: taken by A. W. Stelfox in the following counties: Cavan; Dublin; Kildare; Wicklow; all specimens taken between September and November with the exception of one female taken in March at Deputy's Pass, Co. Wicklow.

Exallonyx confusus is a very common little species. I have taken large numbers of it attracted to dried and well-rotted fungus in which the larvae of several species of Diptera had fed or were still feeding. Such a medium as this with its large insect population becomes very attractive to Staphilinid and other beetles. It is probably for the purpose of seeking out coleopterous larvae that the *Exallonyx* females come to the fungus.

8. **Exallonyx curtigena** sp. n.

♀. Whatever doubts there might be concerning the validity and limits of the preceding species, there need be no uncertainty about this one. It is an insect which, for an *Exallonyx*, is unusually sharply defined by the shortness of the malar space and the resulting shape of the head, as exhibited in a front view.

When the head is seen from above (fig. 12), the eyes appear more prominent than in

E. confusus; this is because the frons is a little less convex and the depression between the eye and the central inter-antennal carina slightly deeper. The head varies a little in shape, being usually a little wider than long but sometimes exactly as long as wide. Antennae somewhat characteristically thickened towards apex (fig. 35); funicle 8–10 vary from being more or less square in outline to very slightly longer than their medial width; the squareness of these segments is quite characteristic of this species.

Length: ♀ 2·2–2·9 mm. (including ovipositor).

Distribution: England: Devon (Torquay), Aug., 6 ♀♀, *G. N.*; Gloucester (Staunton & Newland), June, 5 ♀♀, *E. B. Britten & J. F. Perkins*; Hereford (Fownhope), May–June, 4 ♀♀, *E. B. B. & J. F. P.*; London (Tulse Hill), Sept., 6 ♀♀, from rotting fungus, *G. N.*; Surrey (Ashtead, *Type Loc.*), Aug., 1930, 9 ♀♀, *G. N.*; (Boxhill), Sept., 1 ♀, *G. N.* Ireland: Dublin (Saggart), 18.xi.1936, 1 ♀; also Haliday coll., Ireland.

Superficially *E. curtigena* is exactly like *confusus*. Unless specimens are so mounted that a front view of the head can be obtained, it is not easy to tell the two species apart.

9. *Exallonyx brevicornis* (Haliday, 1839).

♀. This is a very distinct species, characterised by the combination of short funicle and very short ovipositor.

The keel between the antennal insertions is very feeble so that the frons here is nearly flat; in this respect, *E. brevicornis* is unlike the two members of the *E. ligatus*-group. Head (fig. 14). The antennae are about as long as the head and thorax combined (fig. 24); the narrowing of the funicle towards apex is an unusual, but by no means striking, feature of this species; the funicle is also rather hairy. Abdomen (fig. 5).

In small examples, the legs are brownish, but in the largest individuals they are (except coxae) uniformly reddish-yellow.

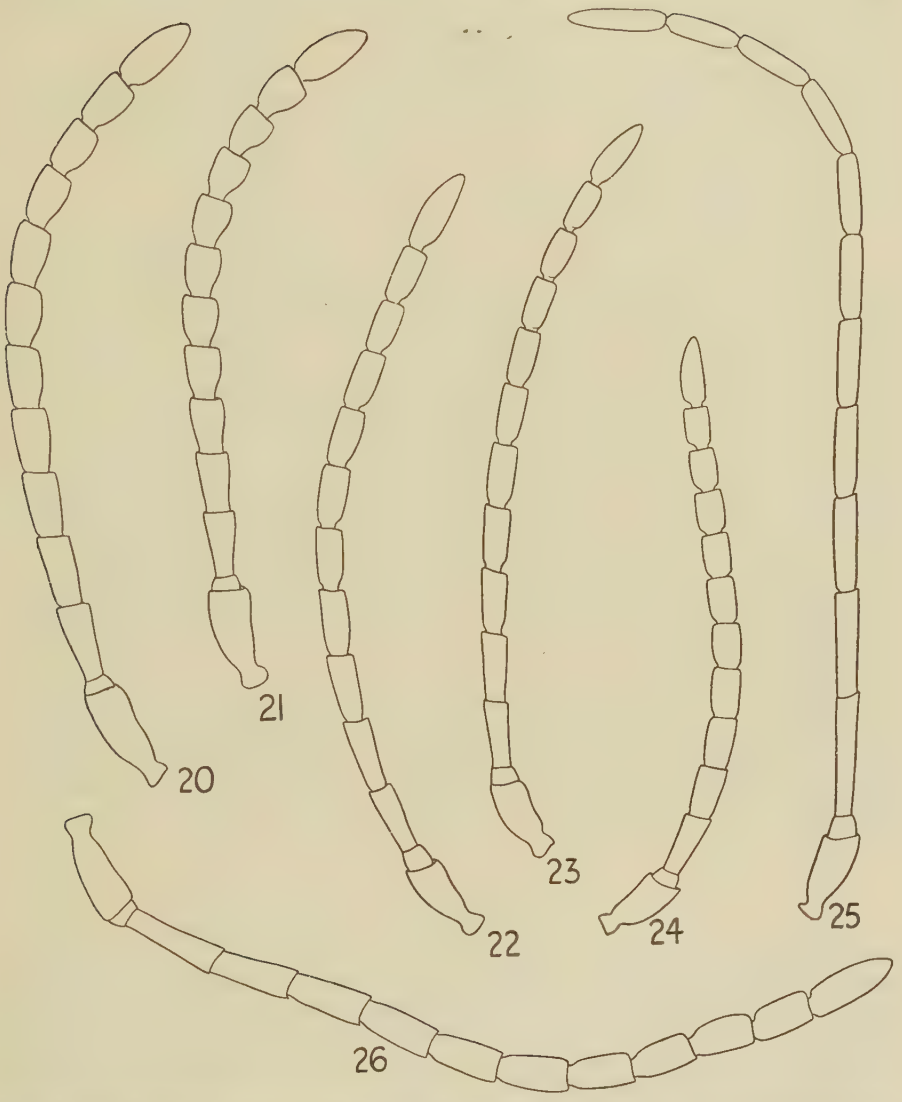
♂. I am fairly confident that I associate the right male with the female. An examination in potash and subsequently in balsam of the funicle of four individuals revealed no trace whatever of specialised structures on three of them but the fourth showed some half-dozen isolated structures distributed over the last three funicular segments; these are shown in fig. 32. The claw character (fig. 4) seems to be valuable but it is certainly difficult to appreciate.

Length: ♂ about 3 mm.; ♀ 2·6–3·7 mm. (including ovipositor); the average size is about 3 mm.

Distribution: England: Berks (Windsor Forest), May, 1 ♂, *H. Donisthorpe*; Devon (Porlock), May, 1 ♀, *J. F. Perkins*; (Torquay), Aug., 1 ♀, *G. N.*; Gloucester W. (Staunton), June, 2 ♂♂, *J. F. P.*; Lancs (Reddish), June, 1 ♀, *H. Britten*; Surrey (Ashtead), Aug., 2 ♀♀, May, 1 ♂, *G. N.*; (Horsley), June, 1 ♀, 1 ♂, *G. N.* Ireland: taken by A. W. Stelfox in the following localities: Carlow (Carricklead), May, 2 ♂♂; Dublin (Saggart), Oct., 2 ♀♀; Nov., 1 ♂; (Glenasmole), June, 1 ♂; Sligo (Trawallua), July, 1 ♀; Wicklow (Athdown), Oct., 1 ♀, from carcase of whale; (Deputy's Pass), April, 1 ♀; (Devil's Glen), May, 1 ♀; (Powerscourt), May, 1 ♂; (Tonlagee), June, 1 ♂.

This is apparently a rare species, but of wide distribution. There are no continental records of its occurrence.

Although very variable in size, *E. brevicornis* should not be at all difficult to recognise, since the structural details which characterise it are very reliable.



FIGS. 20–26.—Antenna of: 20. *Exallonyx ligatus* (Nees), ♀; 21. *Exallonyx microcerus* Kieffer, ♀; 22. *Exallonyx gracilis* sp. n., ♀; 23. *Exallonyx ater* (Nees), ♀; 24. *Exallonyx brevicornis* (Hal.), ♀; 25. *Exallonyx longicornis* (Nees), ♀; 26. *Exallonyx niger* (Panz.), ♀.

10. *Exallonyx wasmanni* (Kieffer, 1904).

1904, *Exallonyx myrmecophilus* Kieffer (**syn. n.**).
1908, *Exallonyx wasmanni* Kieff. var. *socialis* Kieff.

In six out of the seven specimens of this species I have examined, the base of the second tergite is entirely smooth, and makes the species, if this character were absolutely reliable, easy to recognise. But in the seventh, the type of *E. myrmecophilus*, the base of tergite 2, as in the other material, is without a

central groove, but has on each side some very feebly indicated striae, resulting in 2 or 3 short oblong pits of very unequal size.

Legs predominantly yellowish in both sexes.

Head of ♀ distinctly transverse; seen from in front, of same shape as that of *E. confusus*. Antenna (fig. 36).

Petiole in both sexes fully as long as wide, the ridges of its dorsal surface very even, not broken up to form irregular reticulations as in most of the other species.

Length: ♂♀, about 2 mm.

Distribution: ENGLAND: Kent (Darenth Wood), *H. Donisthorpe*, 1 ♀, taken 26.v.1911 in nest of *Lasius fuliginosus* (Latr.); (Wellington College), *H. Donisthorpe*, Sept. 1906, 1 ♂, 1 ♀ (named as *E. wasmanni* Kieff. by Kieffer); Sept. 1907, 1 ♂ (Type of *E. wasmanni* Kieff., var. *socialis* Kieffer); Sept. 1912, 1 ♀ (not the type of *E. myrmecophilus* Kieff. as recorded by Donisthorpe); the above four specimens of *E. wasmanni*, from Wellington College, all of which are in the British Museum (Donisthorpe coll.) were taken with *Lasius fuliginosus* (Latr.); Surrey (Horsley), 7.x.1929, 1 ♀, taken by sweeping, *G. N.*

In his description of *E. wasmanni*, Kieffer mentions a filamentous process which is supposed to arise from the apex of the claw-appendage of the front tarsus. I can find no trace of this process in the type, and I doubt very much if it ever existed, for Kieffer was notoriously unreliable in his descriptions.

The type of *E. wasmanni*, which is now in the Museum Wasmannianum at Valkenburg, Holland, was taken at Linz-am-Rhein, 26.ix.1895, in a colony of *Myrmica ruginodis* Nyl.

The type of *E. myrmecophilus*, which I have also seen, and which is also at Valkenburg, was taken at Exaeten, Holland, vi.1895, with *Lasius fuliginosus* (Latr.). In spite of the trace of striation at the base of the second tergite as mentioned above, I am confident that this insect is identical with *E. wasmanni*. In any case, the amount of this sculpture is much less than is found in *E. confusus*, the only species with which *E. wasmanni*, when it shows such sculpture, could be confused.

11. *Exallonyx donisthorpei* (Kieffer, 1908).

♂. This species is chiefly characterised by the structure of the funicular segments, which is unique in British species of *Exallonyx* (figs. 27, 28, 31).

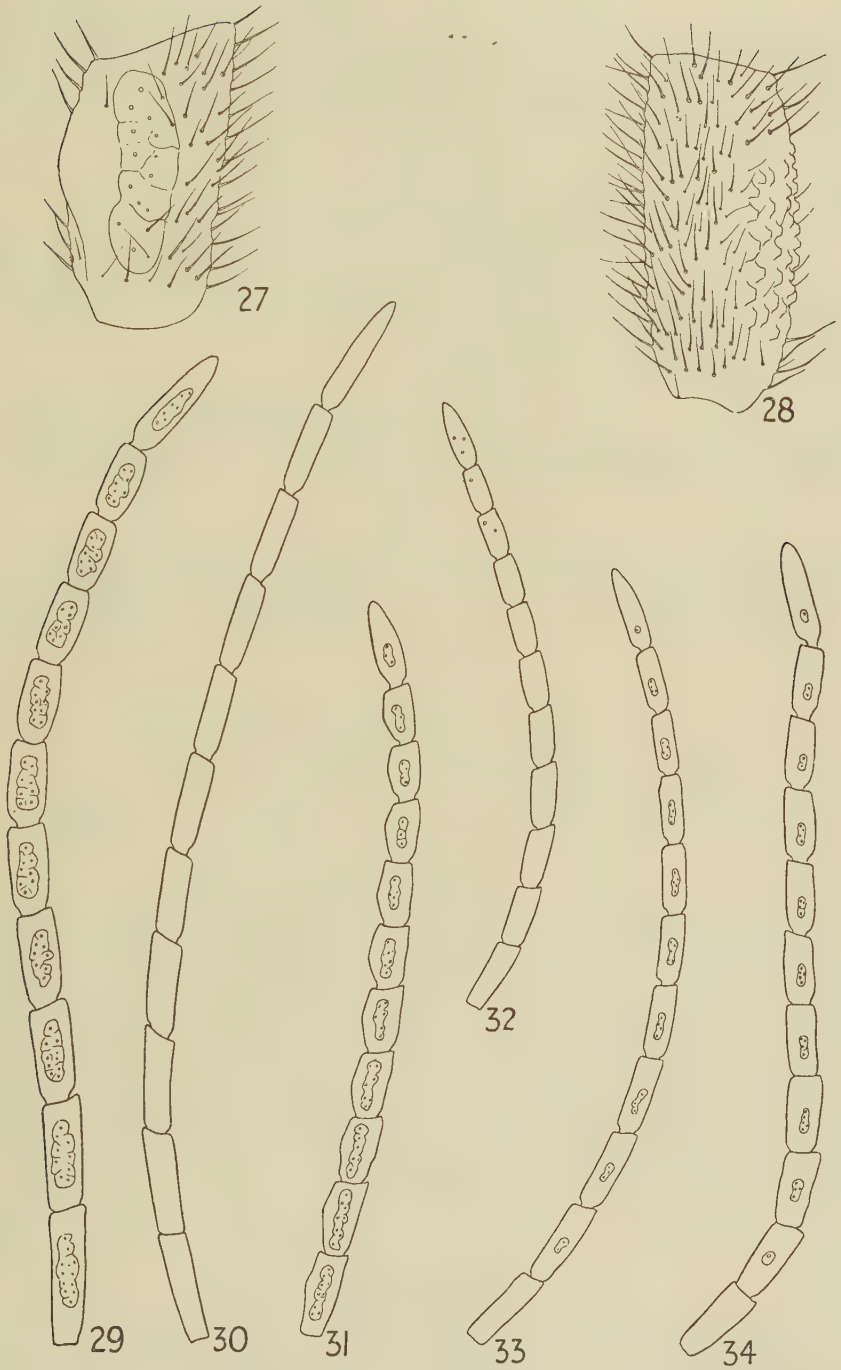
In addition to being strongly smoky (2 examples), the wings are markedly short and show well-defined spurious veins; but in one example (Eynsford), the wings are hyaline; this is probably due to immaturity. Legs stout, particularly the femora swollen.

Length: about 4·3 mm.

Distribution: ENGLAND: Devon (Torquay), Aug. 1929, 1 ♂, *G. N.*; Kent (Eynsford), 31.viii.1929, 1 ♂, *G. N.*; Lancs (Wallasey), Oct. 1907, 1 ♂, in nest of *Myrmica scabrinodis* Nyl., *H. Donisthorpe* (Type of *Exallonyx fumipennis* var. *donisthorpei* Kieffer). SCOTLAND: (Bishopton), 1 ♂, *P. Cameron.*

These specimens are identical with *Exallonyx fumipennis* var. *donisthorpei* Kieffer, the type of which I have examined and which is in the British Museum (Donisthorpe coll.). But, in consideration of the remarks below, I am rejecting the connection of var. *donisthorpei* with *E. fumipennis* Kieffer and prefer to give it the rank of species.

The antennae of *Exallonyx donisthorpei* show such important specific details that one would have expected Kieffer to mention them in his description of



FIGS. 27–34.—27. *Exallonyx donisthorpei* sp. n., ♂, 4th funicular segment; 28. *Exallonyx donisthorpei* sp. n., ♂, 10th funicular segment; 29. *Exallonyx niger* (Panz.), ♂, funicle; 30. *Exallonyx longicornis* (Nees), ♂, funicle; 31. *Exallonyx donisthorpei* sp. n., ♂, funicle; 32. *Exallonyx brevicornis* (Hal.), ♂, funicle; 33. *Exallonyx* (Group III of ♂♂), funicle; 34. *Exallonyx* (Group II of ♂♂), funicle.

var. *donisthorpei*. Such, however, is not the case. Nor does he have anything of particular interest to say about the antennae of his *E. fumipennis*, with which its so-called var. *donisthorpei* does not agree in one important detail, namely: *E. fumipennis* is said to have the antennae "fadenförmig," which is certainly not the case with the type of var. *donisthorpei*.

12. *Exallonyx* (Groups I, II and III of ♂♂).

The males included in these three groups are at least 3 mm. in length and have at least all the femora reddish or brownish-red or reddish-yellow. If the legs are conspicuously darkened in part, the size is usually considerably more than 3 mm. Claw of front tarsus (fig. 2).

Group I.

Hairs of funicle 1 and 2 distinctly a little more than half the width of the segments; all the femora somewhat thickened (fig. 42); legs brownish-yellow, the hind tarsi not noticeably blackened . . . *microcerus* Kieff. (?).

Group II.

All the femora less thickened than in group I (fig. 43); legs often darkened, the hind tarsi frequently conspicuously blackened and contrasting with the paler tibiae; hairs of funicle 1 and 2 slightly less than half the width of the segments (fig. 34) . . . . . *ligatus* (Nees) (?).

Group III.

All the femora of ordinary form, the legs somewhat slender (fig. 44); hind tarsi the same colour as their tibiae whether these be brownish-red or darker; antennae longer (fig. 33), more slender than in groups I and II; hairs of funicle 1 and 2 slightly more than half the width of the segments *ater* (Nees) (?).

The above diagnoses are presented with much caution and sum up the very fragmentary results of a study of numerous males.

The correct association of all males and females of British species of *Exallonyx* will, I think, be discovered only along the path of experimental breeding. The females of *E. microcerus* Kieff. seem to suggest a good starting-off point, for they are frequently to be found searching among heaps of rotting vegetable matter for (presumably) the larvae of beetles. It should not be difficult to secure the kind of beetles—probably STAPHYLINIDAE, for the closely allied *E. ligatus* (Nees) has been bred from *Quedius* larvae—found in such situations, isolate them with the necessary food-supply, dipterous larvae found in decaying matter, and introduce the parasites. The results of such an experiment would certainly be worth while.

Paracodrus Kieffer.

Paracodrus apterogynus (Haliday, 1839).

1907, *Paracodrus bethyliformis* Kieffer **(syn. n.)**.
1858, *Codrus albipennis* Thomson **(syn. n.)**.

The female of this species is a very distinctive-looking insect and can easily be recognised from the figure of the head and abdomen (figs. 10, 45).

The ♂ is characterised as follows :—

Antennae about two-thirds as long as the body, short and thick; funicle 8–10 not more than 1½ times as long as wide. Eyes small. Head, seen from in front, markedly transverse. Metapleura coarsely reticulate-rugose. Propodeum, except for its extreme lateral margins (*i.e.* defined as that part external to a line between the spiracle and the posterior propodeal corner) predominantly smooth and shining. Stigma of fore-wings pale and indistinct; radius likewise pale and indistinct; limits of the radial cell very ill defined. Petiole very short, almost hidden by the 2nd tergite (cf. fig. of ♀ abdomen, which is similar in this respect); striations of tergite 2 very short and fine.

Length : ♂ *c.* 2·8 mm.; ♀ 2·3–3·8 mm.

Distribution : England : Bucks (Slough), Oct., 2 ♀♀ (*A. M. Low*); Cambridge (Wicken Fen), Sept., 1 ♀; Devon (Chudleigh) (*W. E. Hodson*) : 4 ♀♀, bred, 2.viii.1930, from larva of *Agriotes obscurus* (L.); Kent (Kidbrook), Sept., 1 ♀; Surrey (Ashtead), Aug., 2 ♂♂; (E. Sheen), Aug., 1 ♂; Sussex (*A. W. Rymer-Roberts*) : 1 ♀, bred Aug., from larva of *Agriotes obscurus* (L.); (Polegate), *C. Mold* : 1 ♂, 1 ♀, bred, 17.v.1936, from larva of *Agriotes obscurus* (L.); Yorks (Selby) (*G. C. Johnson*) : 2 ♀♀, 1 ♂, bred, 15.vii.1927, from larva of *Athous* sp. Ireland : Down (Bangor), bred from larva of *Agriotes* sp.; S. Kerry (Valentia I.) (*Miss Delap*) : 5 ♀♀, bred, 29.vi.1926, from larva of *Agriotes* sp.; Sligo (Trawallua), Aug., 2 ♀♀, July, 1 ♂; Waterford (Dungarvan), July, 1 ♀; Wexford (Cahore), Aug., 1 ♂; in each case, except the first, taken by A. W. Stelfox.

This species evidently has a wide distribution and is probably commoner than might be expected. The bred records suggest that it is attached primarily to beetle larvae of the family Elateridae.

Disogmus Förster.

The three British species are closely and very naturally related. They have the following characters in common :—

Head strongly transverse. Occiput not sharply margined at the sides. Labial palpi 2-segmented. Antennal scape very short and wide in both sexes; at least funicle 4–6 in the ♂ with a process beneath; among the British Proctotrupinae, *Exallonyx donisthorpei* Kieff. is the sole example of a species having similar processes on the antennal segments. Clypeus obtusely angled at the sides. Eyes with a few rather long hairs. Pronotal angles acutely projecting. Notauli indicated, at least anteriorly. Metapleura rugose all over. Stigma of fore-wings narrow, oblong: radial cell fully two-thirds as long as the stigma; well-marked spurious veins present. Propodeum with a well-defined central carina running from base to apex. Petiole varying from transverse to about as long as wide. Ovipositor of ♀ very long and slender, more than half the length of the hind tibia.

There need be no confusion between *Disogmus* and any other British genus within the Proctotrupinae. It is amply characterised by the short diagnosis I have given in the key to the genera.

Key to the species (♂♂).

1. Funicle 3–6 with a conspicuous, sclerotised tooth at about middle beneath; notauli feeble posteriorly, often hardly indicated . . *basalis* (Thomson).
   Funicle 4–6 with a sclerotised keel beneath, which extends from the base of the segment and terminates in a small tooth near the apex; notauli sharply defined throughout . . . . . *nigripennis* (Thomson).

(♀♀.)

1. Mesonotum conspicuously reddish or brownish-red. (Sp. with the antennae somewhat slender; last segment of funicle hardly twice as long as the penultimate; head slightly less narrowed behind the eyes than in the other two species) . . . . . *areolator* (Haliday).
   Mesonotum black or at most brownish-black . . . . . 2.
2. Notauli sharply defined throughout; last segment of the funicle hardly twice as long as the penultimate. (Sp. with the funicle not or only slightly paler at base, thick but hardly thickened towards the apex) *nigripennis* (Thomson).
   Notauli more or less obliterated posteriorly; last segment of the funicle distinctly longer (about 2½ times) than the penultimate. (Sp. with funicle 1–4 at least, conspicuously yellowish; funicle thick and distinctly thickened towards apex) . . . . . *basalis* (Thomson).

Disogmus nigripennis (Thomson, 1857).

1857, *Proctotrupes nigripennis* Thomson, ♂.

The sharply defined notauli extend well beyond the middle of the mesonotum in both sexes. Antennae of ♀ (fig. 41), of ♂ (fig. 40); in view of the fact that the ♂ of *D. areolator* (Hal.) is as yet unknown, the actual shape and position of the antennal structures may be of importance.

Length: ♂ 3–3·8 mm.; ♀ 3·4 mm. (without ovipositor).

Distribution: England: S.E. London (Tulse Hill), a large series, comprising both sexes, taken running over a log (*Prunus*), infested with a species of *Sciara* (Diptera), in May and June during the years 1929 to 1931 inclusive (*G. N.*). Scotland: Inverness (Aviemore), June, 2 ♂♂ (*R. B. Benson*). Ireland (taken by *A. W. Stelfox*): Carlow (Borris), June, 1 ♂; Dublin (Malahide), Sept., 1 ♂; Kildare (Rye Water), May, 1 ♂; Wicklow (Enniskerry), May, 1 ♂, bred from a log; (Powerscourt), May, 1 ♂.

It is interesting to note that the only females I have seen, and which I know to be true *D. nigripennis*, are all from Tulse Hill.

Disogmus areolator (Haliday, 1839).

1839, *Proctotrupes areolator* Haliday, ♀.
1839, *P. areolator* var. *ephippium* Haliday (Curtis nom. nud.), ♀.

Haliday described *P. areolator* from the female (though he mentions varieties of what he considered to be the ♂) and described the colour as very variable. From his description and the material in his collection, it is fairly clear to me that he mixed up two species and possibly three. In interpreting *P. areolator*, I have concerned myself only with the female, since this is the sex first mentioned and the one to which the main body of the description applies. After the description, which leaves out colour, there follow short diagnoses of colour varieties. The first female mentioned is clearly a less bright example of the form *ephippium*, which is itself briefly characterised, as regards colour, later in the paper.

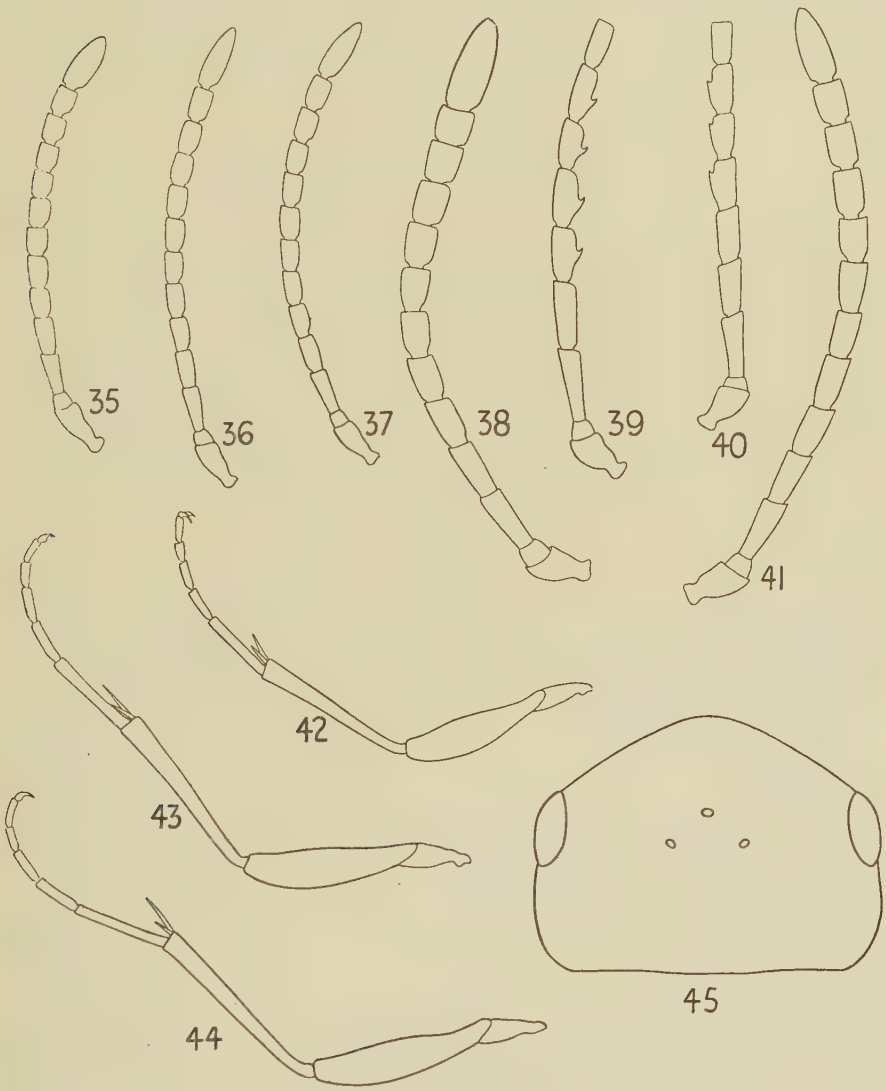
I have found such a female as this among Haliday's material and have labelled it as the type of "*P. areolator*."

The species is very conspicuous on account of the brightly coloured mesonotum. The mesopleura, also, are suffused with red. The legs are yellow.

Length: ♀ 2·8–3 mm. (without ovipositor).

Distribution: ENGLAND: Gloucester West (Staunton), June, 1 ♀ (*J. F. Perkins*). SCOTLAND: Perthshire (Breadalbane Mts.), June, 1 ♀ (*R. B. Benson*). IRELAND (taken by *A. W. Stelfox*): Dublin (Balbriggan), Oct., 1 ♀; Kilkenny (Pink Point), May, 1 ♀; Wicklow (Enniskerry), 5 ♀♀, bred from a log, 23.ix.1931.

It may not be without some significance, I think, that Mr. Stelfox bred a



FIGS. 35–45.—35. *Exallonyx curtigena* sp. n., ♀, funicle; 36. *Exallonyx wasmanni* Kieffer, ♀, funicle; 37. *Exallonyx confusus* sp. n., ♀, funicle; 38. *Disogmus basalis* (Thoms.), ♀, antenna; 39. *Disogmus basalis* (Thoms.), ♂, first 9 antennal segments; 40. *Disogmus nigripennis* (Thoms.), ♂, first 9 antennal segments; 41. *Disogmus nigripennis* (Thoms.), ♀, antenna; 42. *Exallonyx* (Group I of ♂♂), hind leg; 43. *Exallonyx* (Group II of ♂♂), hind leg; 44. *Exallonyx* (Group III of ♂♂), hind leg; 45. *Paracodrus apterogynus* (Hal.), ♀, head from above.

male of *D. nigripennis* from the same log as that which produced the females of *D. areolator*, but in the following May. It is curious, too, that, except for a pair of *D. basalis*, all the female *Disogmus* he has taken in Ireland have been *D. areolator*, while all the males have been *D. nigripennis*. This suggests two things: (1) that *D. areolator*, as I interpret it, may be only a colour variety of *D. nigripennis*, though there are subtle differences between it and the female *nigripennis* from London, and (2) that the Irish males of *D. nigripennis* may be males of *D. areolator*, which I have failed to distinguish from the true *D. nigripennis* male from London. A careful search for the adults on suitable logs, infested with MYCETOPHILIDAE, during May and June and again in September, will probably clear up the matter.

Disogmus basalis (Thomson, 1857).

1857, *Proctotrupes basalis* Thomson, ♂.

This species is amply distinct from the two previous ones. The differences given in the key appear to be the only ones of any value. Head of ♀ (fig. 66). Antenna of ♀ (fig. 38), of ♂ (fig. 39).

Length: ♂♀, about 3·2 mm. (without ovipositor of ♀).

Distribution: ENGLAND: Gloucester West (Staunton), June, 1 ♀ (*J. F. Perkins*); Hereford (Fownhope, Capler Wood), June, 2 ♂♂ (*J. F. Perkins*); S.E. London (Tulse Hill), July, 2 ♂♂, 1 ♀ (*G. N.*), taken on same log as that which produced the long series of *D. nigripennis*. IRELAND: Cavan (Drung), June, 1 ♀ (*R. C. Faris*); Sligo (Trawallua), July, 1 ♂ (*A. W. Stelfox*).

I base the association of the two sexes on the two males and one female taken at Tulse Hill.

Proctotrupes * Latr., 1796.

♀♀.

A. Ovipositor straight, except at apex, where it is sharply decurved. Radius more or less straight. Legs of normal form, the hind femora being long and narrow and fairly evenly tapering from middle to base; hind tibiae about as long as their tarsi; longer spur of the hind tibiae virtually straight. Propodeum normal, widely reticulated all over, seldom with an indication of longitudinal rugosities at base. Abdomen blackish on apical half . . . . . *gravidator* L.

B. Ovipositor evenly curved throughout. Radius markedly curved. Legs short and thick; the hind femora short and thick, not at all narrowed from middle to base; hind tibiae much shorter than their tarsi, *c.* 12 : 17; longer spur of the hind tibiae strongly curved. Propodeum lengthened and narrowed and with a conspicuous longitudinal element in its sculpture. Abdomen red or reddish throughout . . *gladiator* Hal.

♂♂.

A. Propodeum of normal form, not lengthened nor narrowed towards the apex, and, in lateral aspect, strongly but roundly angled behind. Radius virtually straight . . . . . *gravidator* (L.).

B. Propodeum lengthened and narrowed towards apex and in lateral aspect, evenly and very feebly curved from base to apex. Radius markedly curved. . . . . *gladiator* Hal.

* A suspension of the law of priority in the case of *Proctotrupes* has been applied for (*see* Stiles, 1936, *Nature*, **138**: 35. Genotype fixed: *P. brevipennis* Latr., 1802). Accordingly, I use the name *Proctotrupes* instead of *Serphus* Schrank, though the latter has priority.

Proctotrupes gravidator (L., 1758).

This species is very variable in size and also in the extent of the red coloration of the abdomen. Diminution in size tends to be correlated with a general diminution in the extent and brightness of the red colour.

The largest female I have seen is a Swedish example from Stockholm and measures (exclusive of ovipositor) about 7 mm.; the smallest, a female from Ireland, Dublin, with all the femora blackened and hardly any red on the abdomen and measuring about 3·6 mm. (exclusive of ovipositor).

The average length of the male is about 5·5 mm.; of the female 5 mm., without ovipositor.

Distribution: ENGLAND: Cambridge, Sept.; Kent, July and Sept.; S. Devon, June; S.E. London, October; Surrey, Aug. IRELAND (taken by *A. W. Stelfox*) in the following counties: Dublin, Sept. and Oct.; Leitrim, July; S. Kerry, July; Sligo, July; Wicklow, Sept. and May; W. Mayo, May and Sept.

The only record of the breeding of this species, which I know to be authentic, is as follows: 2 ♂♂, 1 ♀, bred singly from *Amara apricaria* (Payk.) (GERMANY: Riese, Elbe). This material was handed to me for examination by Dr. F. van Emden. The parasitised *Amara*-larvae were found in April-May.

Proctotrupes gladiator (Haliday, 1839).

1839, *Proctotrupes bicolor* Haliday ♂ (**syn. n.**).

This species, to judge from the limited amount of material I have examined, is larger, on the average, than the preceding.

The male is about 7 mm.; the female, about 10 mm. (including ovipositor).

A curious sexual difference exists in the shape of the hind tibial spurs. Both are markedly curved in the female, but virtually straight in the male. Haliday, while suspecting the association of the two sexes, described the male under the name *bicolor*. *P. bicolor* Hal., male, is regarded by Kieffer as a subspecies of *P. gladiator*; but he does not state the reasons for his opinion.

In view of the fact that the two excellent characters which help to separate the females of *P. gladiator* and *P. gravidator*, namely, the shape of the hind tibial spurs and of the ovipositor, are ruled out in the males, the latter are separable on only two details of value, both of which I have used in the key.

The leg differences, extremely characteristic of the females, are much less pronounced in the males, though the hind femora of *P. gladiator* ♂ are clearly thicker and less narrowed towards the base than in *P. gravidator* ♂.

The long narrow propodeum is very characteristic of both sexes, but in the female is roundly angled behind, as in *P. gravidator*, not evenly sloping from base to apex, as in the male. This sexual difference seems to be quite usual in the PROCTOTRUPINAE.

Distribution: ENGLAND: Kent (Ramsgate), Oct., 1 ♂ (*J. J. Ward*); S. Devon (Lustleigh), Sept., 1 ♀ (*R. C. L. Perkins*); Surrey (Chobham), 1 ♀ with wings extending only a little beyond the thorax. IRELAND: 4 ♂♂, 2 ♀♀, Haliday coll.

Phaenoserphus Kieffer.

1931, *Carabiphagus* Morley (**syn. n.**).

Morley described *Carabiphagus* to contain *Phaenoserphus laevifrons* (Förster), a species which Kieffer rejected as being insufficiently described.

Through the kindness of Mr. H. Britten, who loaned me his material, I

have seen specimens belonging to the same bred series as that on which Box (1921, *Ent. mon. Mag.* **7** : 92), introduced *P. laevifrons* (Först.) and on which Morley subsequently erected the genus *Carabiphagus*. The series is labelled " Cumberland, Gt. Salkeld, 22.9.1912, from Carabid larva " and is beyond question *P. viator* (Haliday).

Key to species (♂♂).

1. Radial cell long, its length along the edge of the wing being more than half the length of the stigma. Frons between the antennal insertions raised to form a conspicuous keel. Longer spur of the hind tibia very long and curved, almost two-thirds the length of the basal segment of the hind tarsus . . . . . (6) *calcar* (Hal.).

   Radial cell short, sometimes almost wanting, and, when clearly defined, its length along the edge of the wing is less than half the length of the stigma. Frons between the antennal insertions without a conspicuous keel. Longer spur of the hind tibia straight, rarely a little more than half the length of the basal segment of the hind tarsus . . . . . 2.

2. Frons immediately above the antennal insertions very prominently gibbose. Longer spur of the hind tibia distinctly more than half the length of the basal segment of the hind tarsus. Extruded part of the genital claspers spine-like, not much thicker than the longer spur of the hind tibia . . . . . (3) *pallipes* (Latr.).

   Frons immediately above the antennal insertions at most evenly convex. Longer spur of the hind tibia distinctly less than half the length of the basal segment of the hind tarsus. Extruded part of the genital claspers not in the least spine-like and very much thicker than the longer spur of the hind tibia . . . . . 3.

3. Funicle 2–10 (more especially the middle segments) feebly, but distinctly, concave on their outer side, so that the segments do not appear evenly cylindrical. (Sp. with the pedicel sunk more or less completely within the scape) . . . . . (1) *viator* (Hal.).

   Funicle 2–10 normal, evenly cylindrical . . . . . 4.

4. Surface of the propodeum within the delimited dorsal area dull and finely rugose all over. Legs predominantly brownish, especially the tibiae and tarsi . . . . . (5) *fuscipes* (Hal.).

   Surface of the propodeum within the—often ill-defined—dorsal area, in large part smooth and shining, or, at any rate, not finely rugose (2) *dubiosus* sp. n.

(♀♀.)

1. Radial cell long, its length along the edge of the wing being more than half the length of the stigma. Frons between the antennal insertions strongly raised to form a conspicuous keel. (Sp. with the longer spur of the hind tibia about two-thirds the length of the basal segment of the hind tarsus) . . . . . (6) *calcar* (Hal.).

   Radial cell short, often more or less wanting and, at any rate, its length along the edge of the wing never clearly greater than half the length of the stigma. Frons between the antennal insertions never with a conspicuous keel . . . . . 2.

2. Propodeum above with an ill-defined central furrow, never with a trace of a central ridge. Funicle short and stout, somewhat thickened towards the apex, the penultimate segment hardly $1\frac{1}{2}$ times as long as wide. Ovipositor longer than the basal segment of the hind tarsus. (Sp. with the head clearly transverse, seen from in front. Funicle blackish throughout. Abdomen long and narrow, not in the least globose, in lateral aspect) . . . . . (7) *elongatus* (Hal.).

Propodeum above always with a more or less sharply defined, longitudinal ridge, never with a trace of a furrow. Funicle slender, with evenly cylindrical segments, the penultimate one of which is rarely very slightly less than twice as long as wide. Ovipositor not longer than the basal segment of the hind tarsus . . . . . 3.

3. Frons immediately above the antennal insertions prominently gibbose. Longer spur of the hind tibia hardly less—often slightly more—than half the length of the basal segment of the hind tarsus . . . . . 4.

Frons immediately above the antennal insertions at most feebly convex. Longer spur of the hind tibia less than half the length of the basal segment of the hind tarsus . . . . . 5.

4. Funicle 1 pale only on basal half . . . . . (4) *vexator* sp. n.

Funicle 1 pale (more or less yellow) throughout . . . (3) *pallipes* (Latr.).

5. Longer spur of the hind tibia very slightly (sometimes considerably) less than half the length of the basal segment of the hind tarsus. Fore-wings with a well-marked brownish cloud beneath the stigma. Propodeum above becoming entirely smooth towards the base, or the sculpture here very coarse. Ovipositor strongly curved, only slightly shorter than the basal segment of the hind tarsus and conspicuously striate-punctate all over . . . . . 6.

Longer spur of the hind tibia about one-third the length of the basal segment of the hind tarsus. Fore-wings without a brownish cloud beneath the stigma. Propodeum above finely rugose more or less all over. Ovipositor very feebly curved, considerably shorter than the basal segment of the hind tarsus, strongly shining and only feebly striate-punctate. (Sp. with the antennae slender, black more or less throughout) . . . . . (5) *fuscipes* (Hal.).

6. Funicle more or less uniformly brownish throughout . . (2) *dubiosus* sp. n.

First 2 segments of the funicle almost always bright reddish-yellow (1) *viator* (Hal.).

1. *Phaenoserphus viator* (Haliday, 1839).

1839, *Proctotrupes curtipennis* Haliday (**syn. n.**).
1921, *Phaenoserphus laevifrons* (Förster) Box (**syn. n.**).
1922, *Proctotrupes chittii* Morley (**syn. n.**).

This is evidently a variable species, frequently producing forms with wings too short for flight.

The females may be divided into two groups, which, however, are by no means sharply distinct from each other; these are :—

1. Fully winged forms in which the wings are long enough for flight. Radial cell always clearly defined, though narrow. Legs reddish-yellow throughout (except coxae, which are partly infuscated). Petiole variable in length, varying from a transverse condition to one in which it is distinctly elongate, as much as 4 : 3; the elongate condition is by far the more usual.

2. Winged forms in which the wings appear to be too short for flight. Radial cell so short as sometimes to be more or less completely coalesced with the stigma. In a bred series from Cumberland (Fallowfield) (*H. B.*) are some individuals in which the radial cell shows as a pale slit, and others in which it is virtually absent; these latter represent the extreme form *P. chittii* Morley, ♀, the type of which I have been privileged to examine through the kindness of Mr. Claude Morley. Another bred series, Yorks (Halifax) (*G. T. Lyle*), 8 ♂♂, 4 ♀♀, in which all individuals have strongly darkened wings and the radial cell more or less absent, has two of the females (all have shortened wings) with the petiole not at all longer than wide; in this group (2), the

petiole is usually markedly longer than wide. A third series, Essex (Tiptree), 3 ♀♀ from *Carabus violaceus* L., has the wings only very slightly shortened, the radial cell almost wanting and the petiole obviously transverse.

In almost all examples of both groups, the first 4 segments of the antennae are bright reddish-yellow like the legs. Head (fig. 46). Antenna (fig. 59). Apical tergites (fig. 50).

♂. In the large number of individuals I have examined, the antennae are black or blackish throughout, with the funicle thick and markedly tapering towards the apex (fig. 60); all the segments of the funicle have specialised structures, those on segment 1 being extremely numerous and covering the whole of its concave surface (fig. 52). The extruded part of the genital claspers is almost always yellowish.

Length : ♂♀ 3·5–5·4 mm. (including ovipositor of ♀).

Distribution : ENGLAND : Berks; Cumberland; Devon; Essex; Gloucester; Hants; Kent; Surrey; Yorks. IRELAND (taken by *A. W. Stelfox*) in the following counties : Dublin; Kildare; Leitrim; Sligo; S. Kerry; Wicklow; W. Mayo.

I have three females from GERMANY : Heidelberg, vii.1930, in which the wings do not extend much beyond the end of the thorax, though in each of them they are of a disproportionate length. I have no doubt that these specimens are referable to Haliday's *P. curtipennis*, the type of which Mr. Stelfox has been unable to trace. Nevertheless, I do not feel inclined to regard them, in spite of their shortened wings, as anything but *P. viator*, and have accordingly sunk the name *P. curtipennis*.

P. viator (Hal.) is evidently a common and widely distributed species, occurring most frequently from July to October. Important for its recognition are : evenly convex frons, cloud beneath stigma and large, curved ovipositor of ♀; further, in the ♂, conformation of the funicular segments and short scape, with its wide, gaping aperture.

An excellent and very detailed account of the biology of this species has been written by Eastham (1929, Postembryonic Development of *Phaenoserphus viator* (Hal.), *Parasitology*, **5** : 21).

2. **Phaenoserphus dubiosus** sp. n.

This form, which has puzzled me a good deal, very possibly may not be distinct specifically from *P. viator* (Hal.). It differs from that species as follows :—

♂♀. Smaller than *P. viator*, about 3–3·5 mm.

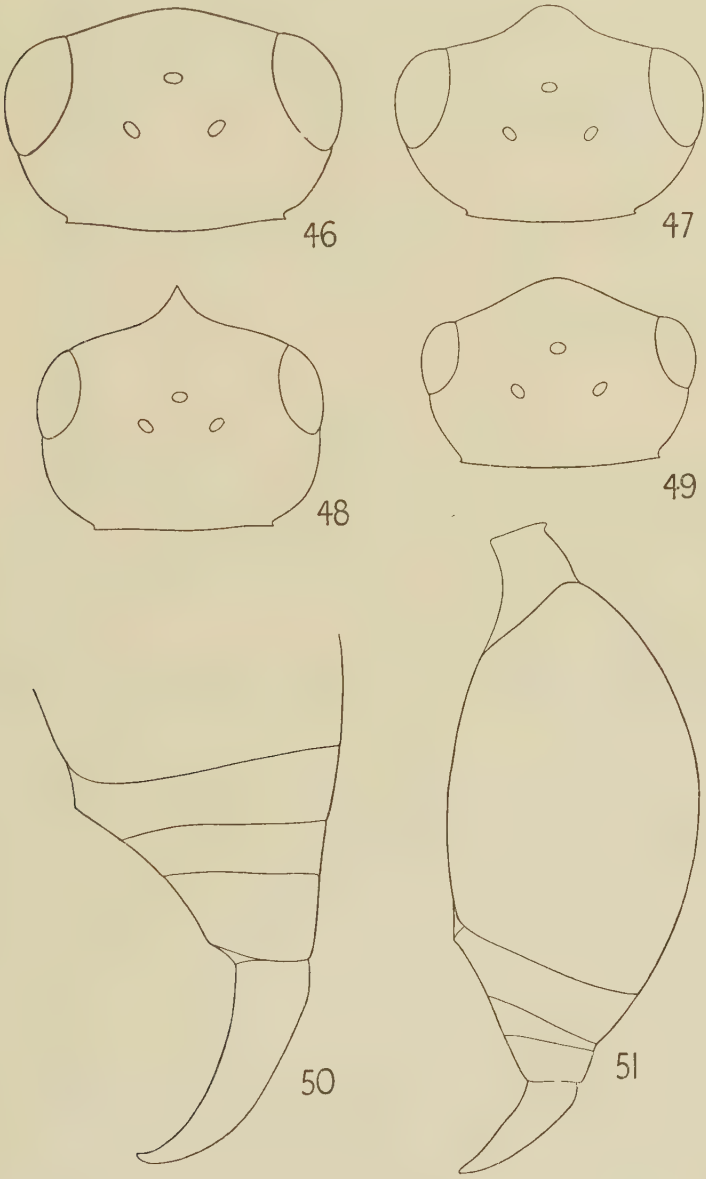
♀. Funicle more slender (in this respect very like *P. fuscipes* (Hal.)), and more or less uniformly brownish throughout. Wings always fully developed, evidently long enough for flight, more hyaline; radial cell always well defined. Legs darker, the hind coxae and hind femora being markedly infuscated.

♂. Funicle not tapering towards the apex, the segments more or less evenly cylindrical; very much fewer specialised structures on the segments; on 1, there are about 7–10 and they are scattered (fig. 53).

Distribution : ENGLAND : Bucks (Slough), 1 ♂, 4.x.1931 (*A. M. Low*); Surrey (Weybridge), *Type Loc.*, Sept., 1936, 2 ♀♀ (1 ♀ the type), 4 ♂♂ (*G. N.*). IRELAND : Dublin (Balbriggan), 1 ♂, Oct., 1932; (Glenasmole), 1 ♂, Aug., 1936; (Saggart), 3 ♀♀, Sept., 1935 (in each case taken by *A. W. Stelfox*).

My faith in *P. dubiosus* as a good species rests almost solely on the form

of the antennae in both sexes and especially on the fewness of the specialised structures on the funicular segments of the male. Nevertheless, a healthy scepticism with regard to its specific validity is not out of place.



FIGS. 46–51.—46. *Phaenoserphus viator* (Hal.), ♀, head from above; 47. *Phaenoserphus pallipes* (Latr.), ♀, head from above; 48. *Phaenoserphus calcar* (Hal.), ♀, head from above; 49. *Phaenoserphus elongatus* (Hal.), ♀, head from above; 50. *Phaenoserphus viator* (Hal.), ♀, apical tergites and ovipositor; 51. *Phaenoserphus fuscipes* (Hal.), ♀, abdomen.

3. *Phaenoserphus pallipes* (Latr., 1809).

This species is at once characterised in both sexes by the gibbose frons (fig. 47), and further, in the male, by the spine-like genital claspers.

♀. Legs reddish-yellow throughout. Antennae somewhat thick, more or less deep black, with the first 3 or 4 segments yellow or yellowish (fig. 57). Longer spur of the hind tibiae very slightly less than half the length of the basal segment of the hind tarsus.

♂. Hind tibiae beyond middle, and the hind tarsi, slightly darkened. No specialised structures on the first funicular segment, but they occur on all the others; they tend to form narrow, elongate, compact patches (figs. 54, 58).

Length: ♂♀ 4–6 mm.; the average length is about 5 mm., including the ovipositor of the female.

Distribution: England: Gloucester; Hants; Kent; Sussex; May–September. Ireland (taken by *A. W. Stelfox*): Leitrim; Wicklow; W. Mayo; May–October.

This is evidently not a common species. It seems to be as frequent in May and June as in August.

4. **Phaenoserphus vexator** sp. n.

With regard to my attitude towards its specific validity, this insect stands in the same relation to *P. pallipes* (Latr.) as *P. dubiosus* does to *P. viator* (Hal.). Both leave room for doubt in my mind.

P. vexator may later be shown to be nothing but an unusual form of *P. pallipes*, but as it can always be separated in the female by small, though apparently constant, details, it seems better to keep it distinct from the previous species, at least provisionally.

♀. Antennae more slender than in *P. pallipes*, brownish-testaceous with only the basal half of funicle 1, and the pedicel, paler; funicle 1 longer in proportion to 2 than in *P. pallipes*; hairs of the funicle, though still extremely short, longer than in *P. pallipes*. Radial cell slightly longer; radius merging more obliquely into the wing margin. Unlike *P. pallipes*, the legs are darkened, the hind femora and the apex of the hind tibiae being distinctly infuscated; longer spur of the hind tibiae very slightly longer than half the length of the basal segment of the hind tarsus.

♂. It seems that the only characters for separating the males of the two species are to be found in the shape and colour of the stigma and the position of the radius, but the differences are not very satisfactory; in *P. vexator*, the stigma is paler, less abruptly narrowed apically; the radius is also less deeply pigmented and more obliquely placed. The arrangement of specialised structures on the funicle seems to be the same as in *P. pallipes*.

Length: ♂♀ 3·7–4 mm. (including ovipositor of ♀).

Distribution: England: Surrey (Weybridge), *Type Loc.*, Sept. 1936, 6 ♀♀ (1 ♀, the type), 2 ♂♂ (*G. N.*). Ireland: Dublin (Saggart), Sept.–Oct., 2 ♀♀, 3 ♂♂; S. Kerry (Dunkerron), July, 1 ♂; Sligo (Toberscanavan), Aug., 1 ♂; Wicklow (Arklow), Aug., 1 ♀; (Glencree), Sept., 1 ♂ (in all cases taken by *A. W. Stelfox*).

This species may be *P. subcompressus* Hedicke. Dr. Hedicke was kind enough to send me, for examination, the male allotype of his species, the female holotype not being in sufficiently good condition to send through the post. This insect appears to be identical with the English and Irish males,

but before using the name *subcompressus*, I should prefer to see the female which Dr. Hedicke described along with the male.

FIGS. 52–56.—First three funicular segments of: 52. *Phaenoserphus viator* (Hal.), ♂; 53. *Phaenoserphus dubiosus* sp. n., ♂; 54. *Phaenoserphus pallipes* (Latr.), ♂; 55. *Phaenoserphus fuscipes* (Hal.), ♂; 56. *Phaenoserphus calcar* (Hal.), ♂.

5. *Phaenoserphus fuscipes* (Haliday, 1839).

Like *P. viator* (Hal.), this species has an evenly convex frons with the inter-antennal carina reduced to a tiny tubercle, situated on a line which would touch the base of each antennal socket.

♂♀. Legs always dark, that is, reddish-brown; even in large examples, in which there tends to be more red in the colour composition, the hind tibiae and tarsi are markedly darkened. Maxillary palpi shorter than in *P. viator*, blackish. Fore-wings nearly hyaline and without spurious longitudinal veins.

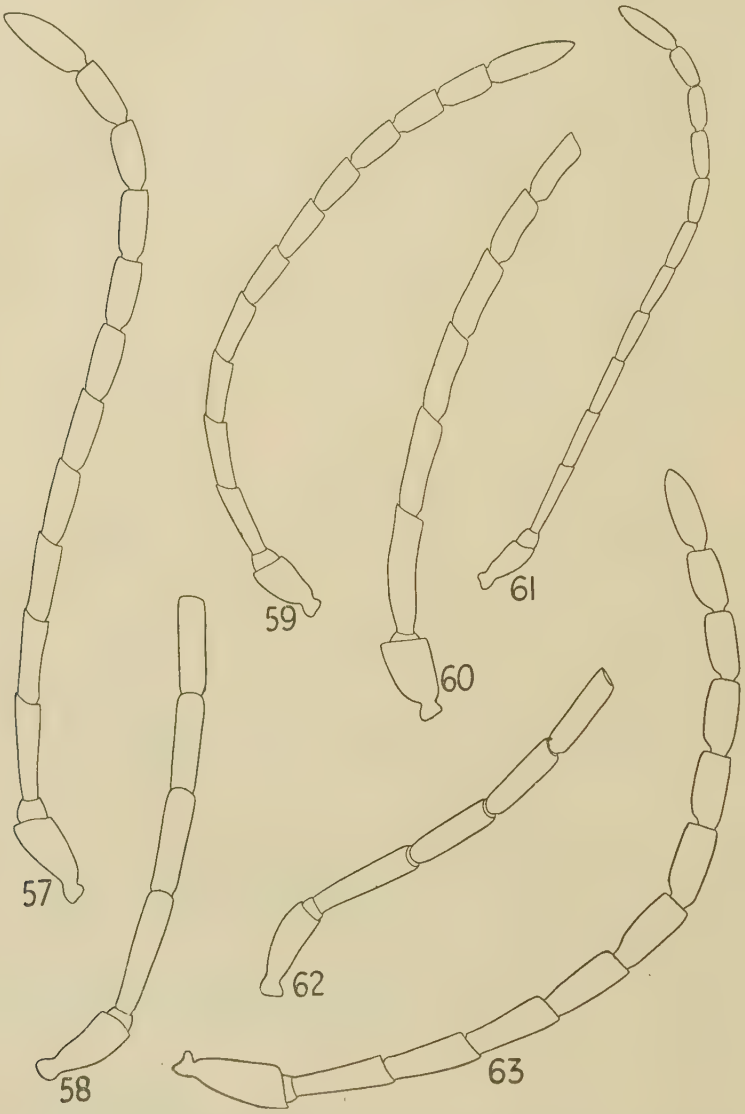
♀. Apart from the characters mentioned in the key and the less useful ones given above, the ♀ has funicle 1 markedly longer than 2 (fig. 61). Abdomen (fig. 51).

♂. The differences between this sex and the ♂ of *P. viator*, as shown in the key, appear to be sound. I must admit, though, that I have seen only two examples. There are no specialised structures on funicle 1 but each of the other segments has two, which are contiguous or nearly so (fig. 55).

Length: ♂♀ 2·9–3·5 mm. (including ovipositor of ♀). This is a much smaller species than *P. viator*.

Distribution: WALES: Glamorgan (Penarth), Aug. 1929, 1 ♀ (*H. M. Hallett*). SCOTLAND: Haliday records this species from Edinburgh. IRELAND

(taken by *A. W. Stelfox*) : Dublin (Saggart), Oct.–Nov. 1935, 4 ♀♀; S. Kerry (Parknasilla), July 1935, 1 ♂, 3 ♀♀; Wicklow (Powerscourt), May 1934, 1 ♂.



Figs. 57–63.—57. *Phaenoserphus pallipes* (Latr.), ♀, antenna; 58. *Phaenoserphus pallipes* (Latr.), ♂, first 6 antennal segments; 59. *Phaenoserphus viator* (Hal.), ♀, antenna; 60. *Phaenoserphus viator* (Hal.), ♂, first 8 antennal segments; 61. *Phaenoserphus fuscipes* (Hal.), ♀, antenna; 62. *Phaenoserphus calcar* (Hal.), ♂, first 6 antennal segments; 63. *Phaenoserphus calcar* (Hal.), ♀, antenna.

This rare little species is characterised in the female by the slender, black antennae and the short ovipositor. Both sexes, too, are distinctive on account of the sculpture of the propodeum.

6. *Phaenoserphus calcar* (Haliday, 1839).

1857, *Proctotrupes calcaratus* Thomson (syn. confirmed).
1857, *Proctotrupes ? seticornis* Thomson (**syn. n.**).

This is a very distinct species, quite unlike the other forms of *Phaenoserphus* and, in my opinion, not closely related to them. It is chiefly characterised by the strongly developed carina between the antennal insertions (fig. 48) and by the long radial cell.

Typical females have the funicle always black or brownish-black with at most the base of segment 1 paler, the legs reddish-yellow throughout with only the hind coxae darkened towards the base (as in most English examples), or, coxae, hind femora and apex of the hind tibiae darkened (as in most Irish examples).

Males show a similar variation in the colour of the femora, but, when these are darkened, there is usually also a darkening of the hind tibiae beyond the middle and a darkening throughout of the hind tarsi. Such dark-legged males are common in both England and Ireland, especially in early summer.

In the majority of females, the propodeum shows no thickened central carina, its entire medial surface from base to apex being widely reticulated; when a central carina is present, it is usually feeble and irregular. Males tend to show this carina more often than the females. Antenna of ♀ (fig. 63), of ♂ (figs. 56, 62).

The petiole in both sexes usually shows well-marked transverse rugae on its posterior half or two-thirds, and strong, longitudinal costae on its anterior part, though the latter are frequently broken up into irregular rugosities. It should be emphasised that I am speaking merely of a tendency towards the formation of a definite sculpture-pattern.

The ovipositor of the ♀ is shorter and less curved than in *P. viator* (Hal.), very shining and with a few scattered punctures.

All the funicular segments of the male have specialised structures on them; they tend to form a single loose row (fig. 56).

Length: ♂♀ 3·4–5 mm.; the females are rarely more than 4·2 mm. (including ovipositor).

Distribution: England: Bucks; Devon; Hants; Middlesex; Yorkshire. Ireland (taken by *A. W. Stelfox*): Carlow; E. Donegal; Kildare; Kilkenny; Leitrim; Longford; Meath; S. Kerry; Sligo; Waterford; Wexford; Wicklow.

This is certainly the commonest British species of *Phaenoserphus*, both sexes occurring continuously (it seems) from June until November.

Mr. Stelfox has taken, in Ireland, a small form of this species in which the legs in both sexes are predominantly brownish or blackish-brown throughout. The funicular segments in smaller females are less elongate than in typical *P. calcar*. I do not feel inclined to regard these small specimens, in spite of the differences in the antennae of some of the females, as anything but varieties of the typical form of the species.

The specimens (1 ♂, 1 ♀), sent to me from Stockholm by Dr. Roman as *P. seticornis* Thomson, are beyond doubt *P. calcar*. But neither of them bears a type label and I am reluctant to suppose that Thomson could have thought them distinct from his own *P. calcaratus*. For this reason I have doubted the synonymy.

7. *Phaenoserphus elongatus* (Haliday, 1839).

♀. This insect stands apart from the other species of *Phaenoserphus* and is not to be confused with any of them.

The legs are always dark, that is, brownish-yellow to yellowish-brown. Maxillary palpi much shorter than in the other species. Head (fig. 49). The sides of the pronotum have a considerable amount of sculpture (mostly wavy striation) anterior to the mid-line of the depression. Antennae: in small examples, segments 8–10 of the funicle are only very slightly longer than wide. Sculpture of the propodeum somewhat characteristic apart from the important central channel, being closely reticulate-rugose. Stigma of the fore-wings pale; radius not sharply defined. Ovipositor very characteristic (fig. 7), long, powerful, evenly curved, tapering to a sharp point and strongly aciculated throughout.

Length: 3·2–4 mm., including ovipositor.

Distribution: ENGLAND: Bucks (Iver), June 1929, 1 ♀ (*O. W. Richards*); Cornwall (nr. Zennor, Trewey Pond), Aug. 1936, 1 ♀ (*G. D. Hale Carpenter*); Westmorland (Windermere) (*A. W. Rymer-Roberts*): 4 ♀♀, bred 1.vii.1916, from a larva of *Athous haemorrhoidalis* (Fab.). IRELAND: Dublin (Bohernabreena), July 1933, 1 ♀ (*G. N.*); (Clontarf), Aug. 1927, 1 ♀ (*E. O'Mahony*); Sligo (Bunduff), Aug. 1932, 2 ♀♀ (*A. W. Stelfox*); (Markree), July 1933, 1 ♀ (*G. N.*); (Trawallua), July 1933, 8 ♀♀ (*G. N*).

This species is evidently rare in England, but of wide distribution. In Ireland it seems to be more frequent. Haliday says of it: "in litoribus Hiberniae borealis rarius." There are no continental records of the species.

Phaenoserphus elongatus (Hal.) is, in my opinion, more closely related to *Paracodrus apterogynus* (Hal.) than to the other species of *Phaenoserphus* occurring in this country. The two species show the following points of resemblance: head of similar shape, especially when seen from in front; short maxillary palpi, though *P. elongatus* has them certainly longer than *P. apterogynus*; similar antennae and facies; somewhat characteristically short, thick legs; sharply pointed ovipositor. It is also significant that the only record of bred *P. elongatus* shows it to be a parasite of an Elaterid larva. So far, *P. apterogynus* has also been bred only from beetle larvae belonging to the ELATERIDAE.

Cryptoserphus Kieffer.

Key to the species (♀♀).

1. Longer spur of the hind tibia very long, about ¾ as long as the basal segment of the hind tarsus. (Spp. with the radial cell long, its length along the edge of the wing greater than half the length of the stigma. Ovipositor very long and slender, considerably less wide than the apex of the hind tibia. Legs in far greater part, pale honey-yellow) group of *aculeator* (Hal.) 2.

   Longer spur of the hind tibia less than, or about, half the length of the basal segment of the hind tarsus. (Intensely black spp. Antennae black throughout, slightly but distinctly thickened towards the apex) . 4.

2. Funicle 10 at most 1½ times as long as wide . . . . *longitarsis* (Thoms.).

   Funicle 10 fully twice as long as wide. (Spp. with the funicle very slender) 3.

3. Mouth very wide, fully twice as wide as the cheek is long (about 5 : 2); frons *between* the antennal sockets feebly but distinctly carinated *cumaeus* sp. n.

   Mouth narrow, at most about 1¼ times as wide as the cheek is long, about 7 : 5; frons *between* the antennal sockets more or less flat . *aculeator* (Hal.).

4. Radial cell long, its length along the edge of the wing fully half the length of the stigma. (Sp. with the legs in greater part brownish or brownish-red. Propodeum tending to be very sharply and distinctly areolated

and possessing, in most examples, two very well-defined post-spiracular areas. Ovipositor slender, hardly as wide at its middle as the apex of the hind tibia) . . . . . *laricis* (Hal.).

Radial cell very short, its length along the edge of the wing much less than half the length of the stigma. (Sp. with the ovipositor stout, fully as wide as, or even slightly wider than, apex of the hind tibia, sharply decurved at apex. Longer spur of the hind tibia less than half the length of the basal segment of the hind tarsus) . . . . *parvulus* (Nees).

(♂♂.)

1. Longer spur of the hind tibia very long, about ¾ as long as the basal segment of the hind tarsus . . . . . group of *aculeator* (Hal.).

Longer spur of the hind tibia less than, or about, half the length of the basal segment of the hind tarsus . . . . . 2.

2. Radial cell long, its length along the edge of the wing fully half the length of the stigma . . . . . *laricis* (Hal.).

Radial cell very short, its length along the edge of the wing much less than half the length of the stigma . . . . . *parvulus* (Nees).

Group of *C. aculeator* (Hal.).

The species of this group are characterised by the long radial cell, long spur of the hind tibia and the slender filiform funicle of the female. The three British species known to me have the following characters in common :—

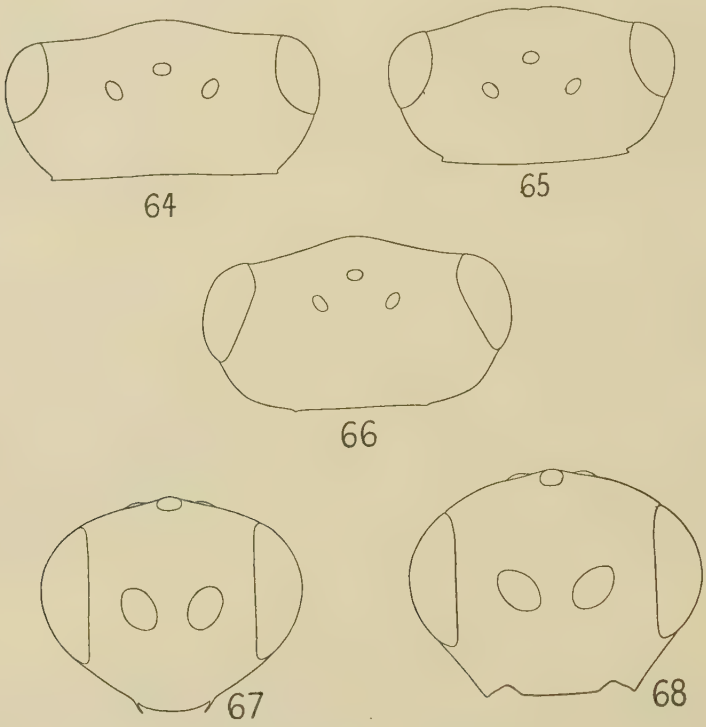
Pedicel and scape yellow or yellowish in the ♀. Maxillary palpi long, slender, yellow. Metapleura virtually smooth all over, except at lower, anterior corner. Propodeum with a central carina which separates its dorsal surface into two, oblong, smooth or nearly smooth, areas. At least the two front pairs of legs entirely honey-yellow in both sexes, very slender; hind tarsus distinctly longer than its tibia in both sexes. Ovipositor of ♀ virtually parallel-sided and, seen from above, with its *extreme* tip slightly dilated and flattened. Eyes virtually bare in both sexes.

Cryptoserphus aculeator (Haliday, 1839).

This species is readily distinguished by the narrow mouth opening (fig. 67). The frons immediately below the antennal insertions is slightly gibbose. The propodeum is longer than in the two following species, the dorsal carina and the two dorsal areas being longer; the ridge separating the dorsal from the posterior surface is strongly developed and the posterior areas themselves tend to be very sharply defined and, generally, finely sculptured. Abdomen (fig. 69). Normally, the sides of tergite 2, at apex, are smooth and shining, but I have referred to this species a female (Trawallua, July (*G. N.*)), in which this part is conspicuously finely and closely punctate; in this female, tergite 3 is likewise finely and closely punctate; but apart from colour (the body is brown), I can detect no difference between it and typical *P. aculeator* females. Mr. Stelfox has taken two males (Dublin, Slade Brook, May, and Wicklow, Powerscourt, May), both of which have the sides of tergite 2, at apex, and all the exposed part of 3, densely, finely and conspicuously punctate; these two ♂♂ and the ♀ mentioned above may represent still another species within the group, but owing to lack of material I prefer to regard them provisionally as unusual forms of *P. aculeator*. The apex of the hind tibiae is sometimes blackened in both sexes.

Length: ♂, about 3 mm.; ♀, about 3·6 mm. (including ovipositor, the apical tergites being retracted as in life).

Distribution: ENGLAND: Berks (Windsor Forest), Sept. (*H. Donisthorpe*); Gloucester West (Staunton), June (*J. F. Perkins*); Hants (Brockenhurst), June (*G. N.*); Surrey (Ashtead), May; (Horsley), May (*G. N.*). WALES: Glamorgan (Cardleston), May (*H. M. Hallett*). IRELAND (taken by *A. W. Stelfox*): Carlow (Carricklead), May; Dublin (Glenasmole), Sept.; (Slade Brook), June; Kilkenny (Pink Point), May; Leitrim (Tullaghan), July; Sligo (Trawallua), Aug.; Wicklow (Clara), May–June; (Glencullen), Aug.



FIGS. 64–68.—64. *Cryptoserphus parvulus* (Nees), ♀, head from above; 65. *Cryptoserphus cumaeus* sp. n., ♀, head from above; 66. *Disogmus basalis* (Thoms.), ♀, head from above; 67. *Cryptoserphus aculeator* (Hal.), ♀, head from in front; 68. *Cryptoserphus cumaeus* sp. n., ♀, head from in front.

Cryptoserphus cumaeus sp. n.

♀. This species can at once be separated from *P. aculeator* (Hal.) by the wider mouth-opening (figs. 65, 68). Apart from this and the presence of the inter-antennal keel, it seems to differ only in the shape and sculpture of the propodeum; this is shorter, and the carinae bounding the two dorsal areas laterally and posteriorly tend to be much less well developed; again, the posterior face of the propodeum is not sharply bounded by lateral as well as dorsal carinae, as is usually the case in *P. aculeator*; also, the surface here tends to be coarsely and widely reticulate. Ovipositor fully 12 times as long as its middle width.

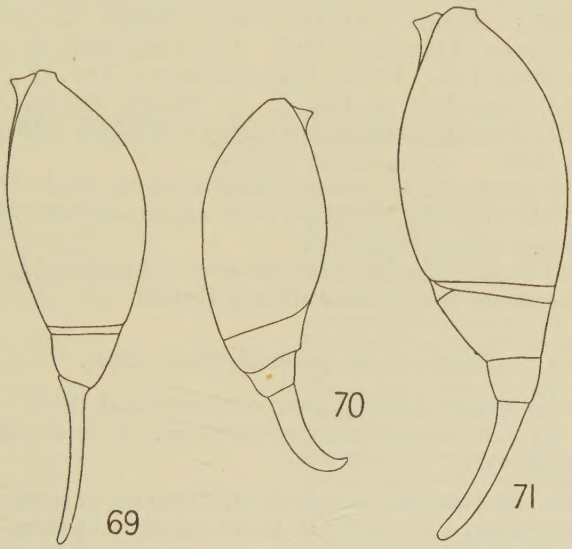
Length: about 3·6 mm. (including ovipositor, the tergites being normally retracted).

Distribution : IRELAND : Dublin (Saggart), Oct., 1 ♀ (*A. W. Stelfox*); Sligo (Trawallua, *Type Loc.*), July, 2 ♀♀ (*G. N. & A. W. S.*); Wicklow (Ballyhenry), Sept., 1 ♀.

C. cumaeus seems to be closely related to *C. perrisi* Kieffer, but this species is supposed, according to Kieffer, to have the metapleura dull.

Cryptoserphus longitarsis (Thomson, 1857).

♀. This species is evidently very closely related to *C. cumaeus* sp. n., having a wide mouth-opening similar to that species. Apart from the differences in the lengths of the antennal segments, the two species may be compared as follows: in *C. longitarsis*, the face below the antennal insertions is smoother, more shining; the subantennal hump is smooth all over and there is hardly a trace of a carina between the antennal sockets; in *C. cumaeus*, the inter-antennal carina extends downwards over the subantennal hump. The clypeus, too, is smoother in *C. longitarsis*, less raised away from the mouth and more convex.



FIGS. 69–71.—Abdomen of: 69. *Cryptoserphus aculeator* (Hal.), ♀; 70. *Cryptoserphus parvulus* (Nees), ♀; 71. *Cryptoserphus laricis* (Hal.), ♀.

The smaller female (Brockenhurst) is honey-brown all over, though the head is darker, and agrees in colour perfectly with the type of *C. longitarsis*; the larger female (Windsor Forest) is much darker brown, with the pronotum paler.

The ovipositor of *C. longitarsis* is decidedly a little shorter than in the preceding species, being only about 7–8 times as long as its middle width.

Length : 2·4–3 mm. (including ovipositor, the tergites being normally retracted).

Distribution : ENGLAND : Berks (Windsor Forest), Oct., 1 ♀ (*H. Donisthorpe*); Hants (Brockenhurst), June, 1 ♀ (*G. N.*).

This species is certainly *C. longitarsis* Thomson, but I am not absolutely satisfied that it is specifically distinct from *C. cumaeus*. More material will help to decide.

Cryptoserphus laricis (Haliday, 1839).

♂♀. The pronotal angles of this species are very prominent, much more so than in the *C. aculeator*-group. Palpi blackish and shorter than in the *C. aculeator*-group. Eyes with a few rather long hairs.

♀. Antennae somewhat thick, black throughout, except for the reddish pedicel; funicle 10 about 1½ times as long as wide; in both sexes, the scape is very short and strongly widened towards the apex. Parapsidal furrows showing as short, deep, humeral impressions. Metapleura much less well defined and less extensive than in the *C. aculeator*-group, its surface tending to be broken up, especially posteriorly, by a good deal of coarse sculpture. The well-defined post-spiracular area of the propodeum is somewhat concave and, on the whole, finely sculptured. Abdomen (fig. 71). Ovipositor shorter, stouter, and more obviously widened towards the base than in the *C. aculeator*-group.

Length: ♂ 2·8–3·5 mm.; ♀ 2·9–3·8 mm. (without ovipositor).

Distribution: ENGLAND: Berks (Temple), May, (Bagley Wood), April; Cambridge (Storey's Way), May; Herts (Aldbury Owers), May & (Boxmoor) April; Kent (Goudhurst), April; S. Devon (Dartmoor), April; S.E. London (Tulse Hill), Oct.; Surrey (Claygate), May; Sussex (Burgess Hill), May. SCOTLAND: Inverness (Aviemore), June. IRELAND (taken by *A. W. Stelfox*): Cavan (Sloan's Fort), Oct.; Dublin (Bohernabreena), Dec. (2 ♀♀); (Shankill), May; (Saggart), Sept.–Nov. & Dec. (1 ♂); (Slade Brook), June; Kildare (Leixlip), April; Wexford (Duncannon), May; Wicklow (Glencullen), Nov.; (Powerscourt), June.

This species seems to be widely distributed in England and Ireland, though not at all common. It is perhaps significant that Mr. Stelfox has taken both sexes as late as December.

There should be no difficulty whatever about identifying *laricis*, for it is a very distinct insect and has no close allies in Britain.

Cryptoserphus parvulus (Nees, 1834).

This species is widely different from *C. laricis* and the *C. aculeator*-group and is one of our most distinct PROCTOTRUPINAE. It is chiefly characterised by the short radial cell.

♂♀. Head more transverse than in *C. laricis* (Hal.) and the *C. aculeator*-group (fig. 64). Pronotum, by comparison with that of *C. laricis* and the *C. aculeator*-group, very distinctive and differing in important details; the pronotal angles (callouses) are flattened in front, so that the thorax has a truncated appearance anteriorly; further, these callouses, seen from the side, are sharply margined in front and above, the anterior margin joining the anterior lateral margin of the pronotum just below the middle of the latter; in this respect, *C. parvulus* is strikingly different from the other British species of the genus; in small examples, the dorsal ridge of the callous is not so clearly marked as in large specimens. Mouth opening very wide.

Fore-wings nearly hyaline; stigma large, heavily pigmented, rounded, not angled below; radius without a short foot-stalk as in *C. laricis* and the *C. aculeator*-group. Abdomen (fig. 70).

Length: ♂♀ 2·5–3·5 mm. (excluding ♀ ovipositor).

Distribution: ENGLAND: Berks (Windsor Forest), Sept. (*H. Donisthorpe*); (Windsor Park), both sexes bred iv.1932 by *O. W. Richards* from bracket-fungus on Ash, containing *Orchesia micans* (Panz.); Devon (Torquay), Aug. (*G. N.*); Hants (Brockenhurst), Aug. (*G. N.*); (New Forest), May (*G. T. Lyle*);

Hereford (Capler Wood), May (*E. B. Britten & J. F. Perkins*). IRELAND: Dublin (Glenasmole), 25.viii.1936 (*A. W. Stelfox*).

In connection with this species, it would be as well, I think, to say a few words about *Cryptoserphus laeviceps* (Thomson), the type of which I have seen. It is closely related to *C. parvulus*, falling naturally within the same species-group. The female differs from that of *C. parvulus*, chiefly in having the ovipositor much thicker, distinctly widened beyond the middle and less decurved at apex.

In a genus with species so rare as *Cryptoserphus*, it is not improbable that Thomson's species may one day turn up in Britain.

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